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ETHNOLOGY.—*An early Cherokee ethnobotanical note.*[1] JOHN WITTHOFT, University of Michigan. (Communicated by W. N. FENTON.)

Most of the published Cherokee ethnobotanical data have been drawn from the Cherokee communities still resident in western North Carolina. These Cherokee belong to the so-called Middle Dialect group; almost nothing is known of the ethnobotany, or indeed, of any traditional material, from other Cherokee groups. The small amount of data on Oklahoma Cherokee herbalism collected by Dr. John R. Swanton from Indians of Natchez descent living among the Oklahoma Cherokee agrees neither in usage nor native names with other published Cherokee material or with recent data from Qualla Reservation, North Carolina.[2] Thus it is especially gratifying to find an early, if brief, account of plant usage among the Cherokee of the Western, Mountain, or Upper Dialect group, written prior to their removal to Indian Territory.

John Gambold was a Moravian minister who served as a missionary to the Cherokee at Spring Place on the Conasauga River (now in northwestern Georgia) from 1805 to 1825. His wife, Anna Rosina Gambold, was a botanist and one of Henry Muhlenberg's correspondents. Her notes and herbarium specimens contributed much to early botanists' knowledge of the Cherokee country.[3] Henry Steinhauer, a botanist who visited Spring Place about 1817, wrote with admiration of Mrs. Gambold's botanical and ethnological collections.[4] It is probably too much to hope that such an important herbarium and series of ethnological material should still be in existence, but letters and other manuscripts containing ethnographic data may have survived, awaiting discovery by some student of southern botany. A Gambold manuscript, apparently found among Muhlenberg's papers, was published in 1818, and includes a list of plants found in the vicinity of Spring Place and notes on the Indian utilization of certain of these plants.[5] Several of the usages noted by Mrs. Gambold are known to my informants at Qualla Reservation; the other plants, when utilized, are employed for entirely different purposes. Unfortunately, so little is known about Oklahoma Cherokee ethnology that no comparison with modern Western Cherokee traditions is possible. The following series of notes is copied from Mrs. Gambold's article; the common and scientific names of the plants have been changed to a more modern terminology.[6]

Red maple, *Acer rubrum* L. "The inner bark boiled to a syrup, made into pills, and these dissolved in water, is used in case of sore eyes; the eyes washed therewith."

Black cohosh, *Cimicifuga racemosa* (L.) Nutt. "The root in spirits, these made use of in

[1] Received December 23, 1946

[2] SWANTON, JOHN R. *Religious beliefs and medical practices of the Creek Indians.* 42nd Ann. Rep. Bur. Amer. Ethnol.: 666–670. 1928. Also scattered notes in the published works of James Mooney and Franz Olbrechts, manuscript field notes of James Mooney in the archives of the Bureau of American Ethnology, and data from my current field studies of Cherokee ethnobotany.

[3] BARNHART, JOHN HENDLEY. *The botanical correspondents of Schweinitz.* Bartonia 16: 26. 1934.

[4] *Ibid.*, p. 26.

[5] GAMBOLD, MRS. ANNA. *Plants of the Cherokee Country. A list of plants found in the neighborhood of Connasarga River (Cherokee Country), where Springfield is situated.* Amer. Journ. Sci. (Silliman's Journ.) 1: 245–251. 1818.

[6] *Ibid.*, pp. 250–251. The Latin names used are those of the 7th edition of Gray's *Manual*, but Small's *Manual of the southeastern flora*, New York, 1933, was consulted to check the ranges and identifications.

rheumatic pains."

Maidenhair fern, *Adiantum pedatum* L. "A decoction of the whole plant, used as an emetic in cases of ague and fever. A very strong medicine."

Buckeye, *Aesculus* sp. "The nuts, pounded, are used in poultices."

False aloe, *Agave virginica* L. "The root is chewed in obstinate cases of diarrhoea with wonderful success. It is, however, a very strong medicine."

Onion, *Allium* spp. "The Indians are fond of, for culinary purposes."

Angelica, *Angelica* sp. "The same."

Pawpaw, *Asimina triloba* (L.) Dunal. "Of the bark they make very strong ropes."[7]

Hercules-club, devils-walkingstick, *Aralia spinosa* L. "A decoction of the roots roasted and pounded (green, they are poisonous), is given as an emetic. A very strong one."

Wild ginger, *Asarum* sp. "The leaves dried and pounded, are used for snuff; fresh, they are applied to wounds."

Crossvine, *Bignonia capreolata* L. "Tea made of the leaves cleanses the blood."

Strawberry shrub, *Calycanthus floridus* L. "The *roots* are used as (though very strong) emetics. The *seeds* to poison wolves."

Thistle, *Cirsium* spp. "Various species. The roots used in poultices."

Redbud, *Cercis canadensis* L. "Children are fond of eating the blossoms."

Tickseed, *Coreopsis* sp. "The whole plant is much used in coloring. It affords a *red* color."

Dogwood, *Cornus florida* L. "The bark of the root is used to heal wounds, and in poultices."

American holly, *Ilex opaca* Ait. "Of the wood, spoons are made. The berries of use in colics." The Qualla Cherokee use Rhododendron wood for spoons.

Butternut, *Juglans cinerea* L. "A kind of pills are prepared from the inner bark, and used as a cathartic." Mountain Whites in western North Carolina boil the bark of the butternut (and sometimes walnut) into a thick sediment, which is rolled into pills to be used as a cathartic and "spring tonic." The Qualla Cherokee consider these barks too strong for internal medicinal usage and do not use this recipe, although the method of preparation is reminiscent of the Cherokee method of "boiling down" herbs.

Sweetgum, *Liquidambar styraciflua* L. "The gum is used for a drawing plaster. Of the *inner* bark a tea is made for nervous patients."

Tuliptree, *Liriodendren tulipifera* L. "Of the bark of the root a tea is made and given in fevers. It is also used in poultices."

Fly-poison, *Amianthium muscaetoxicum* (Walt.) Gray. "The root is a crow poison; and a sure, but severe cure for the itch."

Pine, *Pinus* spp. "Boil the root, skim off the turpentine, spread it on Deer's skin (tanned) for a drawing plaster."

Mayapple, *Podophyllum peltatum* L. "A sirup is boiled of the root, and given for a purgative, two pills at a time. A drop of the juice of the fresh root in the ear, is a cure for *deafness*. (So I have been told, I never witnessed it.)"

Five-finger, *Potentilla* sp. "A tea of it is given in fevers."

Wild black cherry, *Prunus serotina* Ehrh. "Of the bark a tea is made, and drunk in fevers."

White oak, *Quercus alba* L. "The bark is used for an emetic."

Wild rose, *Rosa* spp. "The roots boiled, and drunk in cases of dysentery."

Tall blackberry, *Rubus* sp. "The root good to chew in coughs."

Bloodroot, *Sanguinaria canadensis* L. "The root is used for the *red* die in basket making." The Qualla Cherokee also use the bloodroot for the same purpose.

Lizardtail, *Saururus cernuus* L. "The roots roasted and mashed, used for poultices."

Nightshade, *Solanum nigrum* L. "When young, made use of as the best relished potherb."

Goldenrod, *Solidago* sp. "A tea much made use of in fevers."

Wild indigo, *Baptisia tinctoria* (L.) R.Br. "A blue die."

Indian pink, *Spigelia marilandica* L. "In cases of worms." This is the general Cherokee and Creek vermifuge.

American ipecac, *Gillenia stipulata* (Muhl.) Trel., and bowmansroot, *G. trifoliata* (L.) Moench. "The whole plant a very good emetic. Of a strong tea or decoction thereof, a pint is drunk at a time."

[7] I know of no ethnographic data on the use of this plant for cordage, but Dr. Volney Jones, of the Ethnobotanical Laboratory, University of Michigan, tells me that examples of cordage made from pawpaw bark are known from several southeastern archeologic sites.

Spiderwort, *Tradescantia* sp. (*virginica* L.) "The leaves much relished greens for the table." This plant is an important green at Qualla.

Adamsneedle, *Yucca filamentosa* L. "The roots pounded and boiled are used instead of soap to wash blankets; likewise to intoxicate fishes, by strewing them pounded on the water. The same is done with Æsculus." The use of *Yucca* as a soporific is widespread in the Southwest, and may have diffused from that direction. The Qualla Cherokee also used buckeye as a fish poison, but *Yucca* is used there only for medicinal purposes.

GEOLOGY.—*Granitization and its significance as a regional metamorphic process in New England.*[1] L. W. CURRIER, U. S. Geological Survey.

In presenting this subject I am taking advantage of the opportunity to set forth a hypothesis and an extrapolation on the results of studies not yet finished. I am deeply conscious of the incompleteness of my own field studies for providing data to support adequately the broad generalization implied by the subject. The thesis, however, is of the sort that requires for its ultimate substantiation facts accumulated from many sources and by many workers. It seems worth while, therefore, to offer a progress report at this time, and to indicate the direction in which a working hypothesis is developing. I am well aware of the ease with which imagination may subtly translate multiple working-hypotheses into a multiply-working hypothesis. I hope this pitfall will be avoided.

Nearly 20 years ago I started rather fitful field observations in the so-called Cambrian and Ordovician terranes of east-central Vermont. In the middle thirties this interest became a planned program under the auspices of the Geological Society of America, and many traverses were made across the Barre, Strafford, Randolph, Woodstock, and Hanover quadrangles. In 1937 a Geological Survey project for the detailed mapping of the Barre quadrangle was started under my general supervision. Shortly after, I was obliged to leave the detailed mapping to my assistant, R. H. Jahns, in order to start another Survey project for the study of commercial granites of New England. Later this project was merged with the Massachusetts cooperative program. In the granite studies I was assisted at various times by H. F. Buie, R. H. Jahns, and N. E. Chute. During the War the regular mapping program and areal studies were suspended, but enough data have been collected by numerous geologists to suggest clearly, it seems to me, a fundamental relation of regional granitic invasion to general metamorphism in New England. In the light of my own observations in central and eastern Vermont, south-central New Hampshire, and Massachusetts supplemented by the study of many thin sections, in the light of the work of a very capable field staff, and in the light of the work of other geologists, especially those who have done such an excellent job of mapping in New Hampshire, I believe that a pattern of igneous and hydrothermal metamorphism is indicated, and that there is a broadly proportional relationship between the manifestations of subjacent igneous invasion and regional metamorphism. In its broadest aspects this thesis is not new; those who have been interested in the literature relating to such problems of metamorphic geology will recall Barrell's paper of 1921.[2]

The granite in northeastern Massachusetts that is known commercially as the "Chelmsford Granite" appears to be an excellent example of the so-called "granitization" process, whereby an "igneous-looking" rock, to use Grout's expression,[3]

[1] Address of the Retiring President of the Geological Society of Washington, presented before the Society on December 12, 1945. Published by permission of the Director of the U. S. Geological Survey. Received December 11, 1946.

[2] BARRELL, JOSEPH, *Relations of subjacent igneous invasion to regional metamorphism.* Amer. Journ. Sci., ser. 5, 1(1, 3): 174–186, 255–267. Jan. and Mar. 1921.

[3] GROUT, F. F., *Formation of igneous-looking rocks by metasomatism.* Bull. Geol. Soc. Amer. 52: 1525–1576. Oct. 1941.

has been derived from a previously existing sedimentary rock by a process of metasomatic replacement through the action of solutions derived from a granite magma, or at least a magma that gave rise to alkali-bearing solutions. The mode of origin of this granite seems particularly significant in connection with the general metamorphic problem, and I shall devote the latter part of this paper to a discussion of this formation. Because of its relation to metamorphism it is pertinent to review the so-called "granitization theory," but I shall not dwell on the history of its development because several excellent reviews have appeared in recent years, notably those by MacGregor and Wilson,[4] Rastall,[5] Shand,[6] and Raguin.[7] Also, H. H. Read[8] has traced the development of thought regarding the relation of igneous action to metamorphism. It is interesting to note that in these discussions granitization and metamorphism have become mutually involved, for it seems impossible to divorce the theories of origin of many of the regional gneisses from the theory of "replacement granite."

It is said that the origin of granites is still one of the outstanding problems of geology, despite the fact that granites comprise one of the most widespread and common species of igneous rocks. The problem is now, of course, far beyond its status of 150 years ago, when Hutton's magmatic theory countered Werner's theory of chemical precipitation from sea waters. Hutton's theory won out because it explained adequately certain field relations and structures that the Wernerian theories were totally unable to account for. The granite problem today relates to the sources and derivations of granite magmas, and the modes of emplacement. Among other things, it involves many bodies of granitic rocks whose spatial relations and structures are still not explainable by emplacement of magma in spaces prepared for its reception by crustal displacement, by force of intrusion, or by stoping. It may be objected that such granites are unusual and unconventional, and generally show some degree of foliation or other parallel structure that will place them in the category of gneisses, rather than true granites. But many—probably most—of the so-called "normal" granites possess a parallel structure in greater or less degree, which is variously attributed to shearing, magmatic flow, or internal adjustment to deformation. Granitic gneisses, gneissic granites, and apparently isotropic granites form a perfectly gradational series, and neither the perfection of the layering or banding nor the apparent absence of foliation is a completely serviceable criterion for the mode of origin. Alternation of clearly developed and persistent lithologic layering implies a preexisting structure of the country rock in many instances, but the more thorough and complete the granitization of a preexisting rock, the more obscure are the vestiges of earlier structures and compositions, so that the structural distinction between "orthogneisses" and "paragneisses" ultimately breaks down. The terms *orthogneiss* and *paragneiss*, therefore, beg the question, for often we cannot easily determine how much of a paragneiss may be of magmatic origin, or whether a supposed orthogneiss is in reality preserving a relict structure. The terms "lit-par-lit" and "injection gneiss" have been conveniently used to explain the alternation of feldspathic or granitic layers with micaceous schist layers; for these, the forcible intrusion of magma as thin leaves has been implied, but commonly without any adequate explanation of the mechanical difficulties involved in the process. It is difficult to comprehend how the thin and delicate septa could be so spread apart and still preserve their remarkable continuity and uniformity of thickness. In some places it is obvious that large quantities of material must have been added, but no appreciable or discernible squeezing aside of the country rock formations is indicated; rather, contacts show wide zones of gradation from gneiss to comparatively uninvaded country

[4] MacGregor, Malcolm, and Wilson, Gilbert, *On granitization and associated processes.* Geol. Mag. 76(6): 193–213. June 1939.

[5] Rastall, R. H., *The granite problem.* Geol. Mag. 2(1). Jan.–Feb. 1945.

[6] Shand, S. J., *Eruptive rocks*, ed. 2: 214–226. 1943.

[7] Raguin, E., *Problèmes de la geologie du granite.* Rev. Questions Sci., An. 56, s.5, t.1, f-3: 325–360. May 20, 1937.

[8] Read, H. H., *Metamorphism and igneous action.* Pan. Amer. Geol. 72(4. 5). Nov.–Dec. 1939.

rock. Moreover, the invading material seems commonly to have been controlled by stratigraphic horizons and lithology. Transitions along the strike are seen to be gradual, from sedimentary rocks to rocks of "igneous composition." Lithologic and field relations in many places have demanded an explanation for a volume-for-volume replacement of material without melting of the country rocks or the intrusion of magma. Hence the so-called "granitization theory."

Granitization, therefore, is broadly defined as a process whereby formations have been changed into rocks of granitic composition and texture without passing through a magmatic stage. Some limit it to a process of recrystallization and replacement of sedimentary rocks without melting to any degree. Others broaden it to include conversion of igneous rocks. Still others include conversion of either sedimentary or igneous rocks partly or largely by melting, involving "palingenesis," "syntexis," and "anatexis." In some instances local melting has doubtless taken place, but melting is certainly not necessary to the process of feldspathization. That some of the replacement granites were never in a plastic condition is attested by the consistent preservation of delicate original structures.

A rock is considered to have been "granitized" when it has been so altered that it approaches closely the composition and texture of granite. Relict structures may be lacking in the most highly granitized products, or recognizable with great difficulty. For sedimentary rocks the "paragneisses" present the most obvious evidences of granitic invasion, but in the more completely granitized rocks the evidence is just as impressive. At one end of a continuous series are the finer-grained phyllitic schists, the quartzites, and other rocks of comparable degrees of metamorphism, in which the evidences of hydrothermal alteration may be largely microscopic. These evidences consist of a small amount of feldspathization and tourmalinization. A host of hydrothermal quartz veins may appear in the country rocks. Such, I am inclined to interpret, are the conditions in the low-grade metamorphic zones of east-central Vermont. So granitization, it seems to me, is a poor term by which to describe this broad and general process of *invasive metamorphism* by hydrothermal solutions and other salic magmatic derivatives. It is predominantly a process of feldspathization, and the results range from rocks that in no obvious way resemble granites to others that are distinguished with difficulty from so-called "true granites." There is nothing peculiar or uncommon about the process that would justify discriminating between "granitization" and some other common phases of igneous metamorphism, and the process should not be set apart categorically as one whose manifestations are found only occasionally, or under particularly unusual conditions. If the local rocks were of favorable composition (such as impure arenytes), were porous enough to permit thorough hydrothermal invasion, were situated at strategic points of attack, and if adequate sources of invasive materials were at hand, the result would be a degree of feldspathization so great that a "replacement granite" was formed. To refer to magmatically intruded granites as "normal granites" in contradistinction to replacement granites" is not only to misuse the term "normal" in more senses than one, but, more disastrously, to fail to recognize the common occurrence of an important general process by becoming lost in admiration of a particularly spectacular local phase.

Accounting for the sources of granitizing solutions leads to most interesting speculations and theories, and is indeed a fertile field for the exercise of scientific imagination. In his discussion of Read's papers Rastall says[9]: "It always seems that the least satisfactory part of all this discussion about emanations and mineralizing fluids and the rest of it is that we do not know where they are supposed to come from . . . if these fluids can turn almost anything into a granite, it seems probable that their own composition must be something like granite, and therefore may arise from the lower part of the sial." If they originate from local bodies of granitic magma they fit clearly into the concept of late stage pegmatitic

[9] RASTALL, R. H., *op. cit.*

solutions and emanations, but oftentimes the volume ratios of emanations to local stocks or batholiths do not seem to be consistent or adequate. The same quantitative relationship applies equally well, incidentally, to the local derivation of granitic bodies from basaltic sources unless both of these, too, be referred to the original separation of sial and sima in the earlier stages of the Earth's history.

In his classic granitization papers relating to the rapakivi granites of Finland, Sederholm[10] introduced the term "migmatite" to indicate a mixture of magmatically injected material and layered country rocks. At first he interpreted remelting as the most important aspect of the alteration, but later he found it necessary to broaden the concept of anatexis so as to involve more than a melt. Solutions were necessary and these were "exudates" of magmas. "Banded" gneisses inherited structures from the original rocks in part by a process of resolution and replacement. In the concluding remarks of his 1923 paper he says, "The metamorphism of these rocks has been mainly chemical. A purely mechanical, so-called dynamo-metamorphism has in most cases been of very little importance. Even the oldest volcanic rocks show only the slightest influence of dynamo-metamorphism." Elsewhere in the same paper he says "The main part of the metamorphism has taken place in obvious connection with the eruption of granite; it can be defined as a regional contact-metamorphism." It is interesting to note that Sederholm considered the veined granites, or "arterites," to be connected in origin always with a known and nearby granite, but he also contended, on a quantitative basis, that his feldspathizing "ichor" could not be the same as the residual liquor from locally intruded magmas. For the same area, Holmquist,[11] too, interpreted an invasive flood of solutions with abundant mineralizers; he pointed out that many of the granitic layers and cross-cutting veins rather closely resembled the country rocks in composition, but concluded, rather strangely it seems to me, that there was lateral secretion of the material under local high temperatures and pressures. In 1938 Backlund[12] argued for the metasomatic replacement origin of the rapakivis, and showed that on the basis of porosities and compositions there was no difficulty involved in transforming a Jotnian sandstone into a rapakivi granite by addition of soda, potassium, and alumina up to 20 per cent or even more, and without essential volume change. He concluded that the migrating elements must have passed upward through well-defined diffusion channels. Incidentally he states that the rapakivi granites are among the most radioactive of the granitic rocks. Two of the important points in his discussion are the involvement of natural rock porosities, and the localization of invasion along defined belts with broad diffusion into the adjacent country rocks.

Sederholm was by no means the pioneer in the study of granitization. In particular the French school of the 80's and 90's set forth ideas that are to be considered as granitization theories, though the term itself was not used. Michel-Levy, LaCroix, Barrois, and others studied the granitic rocks of the Pyrenees and elsewhere, and concluded that country rocks were changed chemically by volatiles and solutions, not necessarily involving fusion temperatures, so that the rocks passed through the sequence

sediment→schist→gneiss→granite

with no sharp contacts; thus they established *feldspathization* as an extensive hydrothermal process under the influence of "les cortéges d'emanations," or, as Termier described them, the "colonnes filtrantes." To these rising columns of emanations from great depths Termier attributed not only regional metamorphism, but also igneous intrusion of the magmatic type—an extreme view, even for today! Synclinal depression and melting or remelting were held accountable for the generation

[10] SEDERHOLM, J. J., *On migmatites and associated pre-Cambrian rocks of southwest Finland*. Bull. Comm. Geol. Finlande, nos. 58 (1923), 77 (1926), and 107 (1934).

[11] HOLMQUIST, P. J., *Typen und Nomenklatur der Adergesteine*. Geol. Fören. Stockholm Förh. **43**. 1921.

[12] BACKLUND, H. G., *The problems of the rapakivi granites*. Journ. Geol. **46**(3): 339–396. Apr.–May 1938.

of magmas and the freeing of hydrothermal solutions.

The sources of feldspathizing or granitizing solutions have been attributed variously, therefore, to deep-seated sialic sources, to melting of rocks depressed deeply under geosynclines, to emanations from local fusions, to emanations from local uprisings of granite magmas, and even to reactivation of connate waters, but there is widespread agreement that, whatever the sources, the effect has been to alter country rocks by replacement without essential volume changes. To students of ore deposits this process is well founded as a principle; the regional application of it implicates much broader tectonic and structural control. There are so many possible, and even probable contributing sources that it is difficult to decide which is probably the most important unless, as Grout indicates, the problem is approached quantitatively. It would seem that in most instances a deeper-seated and more general source than local intrusives is indicated. In the New England area this appears especially patent, for the evidences of feldspathization are very widely spread, and though granitic intrusives are distributed through most of the region, few of them have had more than very slight and local thermal effect. Their distribution and probable similarity in age, however, bespeak a broad, subjacent magmatic source. A general zonal pattern of hydrothermal effects is suggested, not by the distribution of the exposed granite masses, but by the distribution of migmatitic domes, replacement granites, pegmatites, quartz veins, and incipient feldspathization and tourmalinization in rocks of low-grade metamorphism. The time relations, however, appear to be generally similar. Together with the feldspathizing emanations, pegmatites, etc., they appear to have had a common, subjacent, source.

Volume-for-volume replacement demands an exchange of elements, but not in stoichiometrical proportions. Under granitizing invasion there is a fixing of alkalis, silica, and alumina. Bases become fugitive, especially iron and magnesia and to a less extent lime. In the low-grade metamorphic rocks of Vermont there are also evidences that considerable amounts of titanium have been introduced, largely as rutile and titanite. It would be valuable to know more about the traveling propensities of aluminum and titanium, especially in the low-temperature hydrothermal range. The pattern of the metamorphism and the compositions of the rocks suggest that the expelled bases are driven into the adjacent and overlying rocks, which might well account for, or help to account for, the strongly biotitic and garnetiferous aspects of the broad aureoles that so commonly seem to be associated with replacement granites and migmatitic gneisses. Continued expansion of the granitized zone would continue to drive the fleeing bases ahead; ultimately they would become fixed in higher, or outer, and broader zones of lower temperature and pressure, and might well be able to produce or assist in producing the outermost low-grade epidotic and chloritic zones of metamorphism, representing the frontiers of invasion into which the fugitive elements have been driven. Of course this is a highly hypothetical picture, but for New England it appears to have a considerable degree of substantiation in fact.

The criteria of "granitization"—or perhaps it is better to call them the diagnostic features—appear in the many papers that have been written about specific areas. They are summarized in Grout's critical paper of 1941 (*op. cit.*). Time does not permit more than a very brief review of a few of these papers. First, however, I would like to comment briefly on the three general types of evidence.

"Granitization" is fundamentally a field problem, and the most cogent evidence is found in the field relations and the megascopic field lithologic features. They include the spatial relations, areal replacement without proportionate pushing aside of strata, continuity of regional structures into the granitic mass, accordance of country-rock structures with those of the migmatite, accordance in orientation of inclusions with the country rock and with themselves, lithologic similarities between inclusions and country rocks (making due allowance for the greater alteration of the inclusions), gradational boundaries (partic-

ularly along the strike), relict structures (especially those of nonigneous origin, such as drag folds and axial plane schistosity), mineralogic layering that reflects comparatively uniform, parallel, and continuous lithologic layering. All of these conditions are to be found, incidentally, in the Chelmsford granite of Massachusetts. The field study involves very detailed mapping of quarries and other exposures in order to detect and trace relations of structures that could not possibly be attributed to magmatic flow or segregation. In the Chelmsford granite mass, for example, it is possible to identify original bedding, folds, and a superimposed schistosity parallel to the axial planes and consequently at observable angles to the bedding or "banding," yet the mass is so thoroughly granitized that the stone is one of the most successful commercial granites in the country. The granitization occurred subsequently or perhaps nearly coincidentally with the development of schistosity.

The second group of features is petrographic. The predominant texture of the granitized rock is such as can be attributed to metasomatic action according to well-established criteria of replacement. Among these criteria are the usual directional penetrations of some minerals in others, mottled and streaky perthitic penetrations, myrmikitic intergrowths, and streaks of mosaic and uniformly sized quartz grains that may well reflect the original stratification of an arenyte. Porphyroblasts of feldspar are usual in granitized rocks, and give a pseudoporphyritic appearance to the replacement granite; these metasomes are commonly unzoned, except for soda enrichment and an abundance of inclusions in the outer parts. The porphyroblasts also present ragged contacts with the groundmass, although exceptionally large ones are quite euhedral in general outline. Common also are streaks or grains of epidotic minerals, and of chloritic minerals that are not specifically related to biotite as though by alteration, while other mafic minerals are scant or wanting. It should be remembered, however, that the chain of deuteric and succeeding hydromagmatic reactions produces such hydrous minerals during the declining stages of the consolidation of a granite magma. More than one variety of plagioclase as separate entities is highly suggestive of a nonmagmatic origin. Reversal in order of paragenesis among the consitituent minerals, especially the feldspars, from that to be expected of a magma of similar composition as the rock in question, is also suggestive, but it is commonly difficult or impossible to obtain such evidence because granitization is brought about chiefly by the alkaline and siliceous end products of magmatic differentiation. By and large, then, petrographic evidence is a corroborative corollary to field evidence, but is not conclusive in itself, for both the mineral compositions and the textural relations of "magmatic granites" are simulated by hydrothermal replacement.

The third category is chemical analyses. There seem to be few things that arouse the ire and aggressiveness of critics so much as the failure to give chemical analyses, unless it be the author's interpretation of his analyses. And I might add that there are few things that arouse the imaginative faculties of a geologist more than does a series of selected analyses.

Chemical analyses are particularly useful in demonstrating a variability of the replacement granite beyond that ordinarily found in magmatic granites, except of course in the chilled border zones. Such variability is not, however, a real criterion. The comparison is apt to be the less valuable the more perfect the replacement, for, if the process is accomplished by a solution whose composition is closely similar to that of a granite magma—especially of alaskitic type—the approach to complete replacement will tend to reduce the variability and the difference from a "normal" granite. Comparison with the alleged "average analysis" of known granites is generally an unconvincing argument, although it does serve some purpose in demonstrating exceptional or uncommon amounts of some constituents. Indeed, replacement granites may display a remarkable degree of similarity with associated intrusives and of uniformity within themselves. This probably reflects not only the uniformity of the original rock but also the simplicity of

the granitizing solutions. It seems probable, indeed, that although the constituents of the rock are reassembled to form a new suite of minerals, the quantitative change is not necessarily great. As stated earlier, for the rapakivis Backlund rationalized as much as a 20 per cent addition of alkalis and alumina, but probably the additions are seldom so great, though I have no quantitative data at hand to support this statement, except through a comparison of selected analyses of impure sandstones and well-known granites. I suggest an addition of not more than 5 to 10 per cent in most instances, with the principal changes being effected by a loss of a few percent of bases and a gain of a few percent of alkalis and alumina. In the New England area there seems to be consistent addition of soda, for albitization in some degree marks rocks of all grades of metamorphism. Billings[13] notes, too, the introduction of 2 to 3 per cent of potash in high-grade schist in the Franconia region of New Hampshire.

It would be highly illuminating if chemical analyses of the original sediments could be compared with the granitized products. However, analyses of the unaltered or very slightly altered parts of the formations replaced must generally represent parts so remote from the highly granitized area that the significance of the comparison is uncertain. The normal variations in the original compositions of these rocks may well be of the same general order of magnitude as the changes produced by granitization of the same beds elsewhere.

One of the earliest papers published in this country relating closely to the general subject of granitization, though not specifically emphasizing a dominant role for hydrothermal replacement was that by Fenner.[14] This paper should be read by everyone pursuing the subject. In it Fenner describes the finely and evenly banded gneisses. He argued against the possibility that plastic flow produced the elongated structure, and argued for a pronounced fluidity of the invading materials. For part of the complex, at least, he suggests that the attributes of a rigid body were retained and that "the advance of the main body of magma would be preceded by that of a more dilute portion which would be able to impregnate the wall-rock with facility and initiate processes of transformation and solution which the more concentrated body following would carry farther toward completion."

In 1927 Quirke[15] presented before a meeting of the Geological Society of America a description of a migmatized quartzite in the Killarney, Ontario, region which grades along the strike into granite "that is scarcely distinguishable from the once liquid granite of the vicinity." Quirke is said to have given new impetus to the granitization idea in America. At any rate his 1927 paper was startling to many geologists, but since that time the theory has been much more widely invoked.

In 1934 Lamey[16] described metamorphic effects by the Republic granite in northern Michigan, and the transitions

quartzite→gneissoid quartzite→gneiss→gneissic granite, and
argillaceous rocks→alusite-biotite-staurolite-chloritoid-albite schists

This is particularly interesting in the implied relation of chloritoid and staurolite to granitization.

In 1934 A. L. Anderson[17] described the effect of a granodiorite intrusive on quartzite and interpreted the transition

quartzite→porphyritic granite→granite

The granitic mass has a schistose border zone.

Stark[18] (1935) described the replacement

[13] BILLINGS, MARLAND P., *Introduction of potash during regional metamorphism in western New Hampshire*. Bull. Geol. Soc. Amer. **49**(2): 289–302. Feb. 1, 1938.

[14] FENNER, C. N., *The mode of formation of certain gneisses in the Highlands of New Jersey*. Journ. Geol. **22**: 594–612, 694–702. 1914.

[15] QUIRKE, T. T., *Are some intrusions replacement deposits?* (abstract). Bull. Geol. Soc. Amer. **38**: 119–121. Mar. 30, 1927. See also by same author, *Killarney gneisses and migmatites*. Bull. Geol. Soc. Amer. **38**(4): 753–770. Dec. 30, 1927.

[16] LAMEY, C. A., *Some metamorphic effects of the Republic granite*. Journ. Geol. **42**(3): 248–263. Apr.–May 1934.

[17] ANDERSON, A. L., *Contact phenomena associated with the Cassia batholith, Idaho*. Journ. Geol. **42** (4): 276–392. May–June 1934.

[18] STARK, J. T., *Migmatites of the Sawatch Range, Colorado*. Journ. Geol. **43**(1): 1–26. Jan.–Feb. 1935.

migmatitization of large areas of schists bordering the Pikes Peak granite in the Sawatch Range, Colorado. He stressed the porphyroblastic texture of the schist, and the gradation of the granite into a mixed zone of granitic material and biotite-chlorite schist, with most of the biotite and chlorite laminae ending abruptly against the feldspar porphyroblasts.

G. H. Anderson[19] (1937) described the Pellisier granite in the northern part of the Inyo Range, California, and discussed its replacement origin as a result of the intrusion of a massive granite that underlies and forms the core of the Range. Arenytes, argillaceous rocks and volcanics were involved in the transformation. One of his significant points relates to the fugitive nature of the bases, particularly iron; he shows that the iron ranges from about 2.5 per cent in the main body of the granite to 4.5 per cent in the Pellisier granite, and from 5.5 per cent to 9.0 per cent in the overlying schists, the largest percentage being in the argillite that overlies the granite.

In 1941,[20] Grout gave warning to the fast-growing group of proponents of the granitization theory, some of whom, intrigued by the simplicity of a replacement mode of origin for many granitic rocks seemed inclined, he thought, to apply the theory too broadly, or with too scant evidence. He called for more specific data on volume relationships, textures, relict structures, relations to orogeny or other periods of deformation, chemical changes, etc. He makes a most effective plea for definition of terms and abandonment of loose terminology. He gives an imposing list of criteria to be satisfied. The criteria are excellent and the list is surely complete and well worth study by any student of the subject. He seems to be very exacting, however, as to the amount of corroborative evidence required to prove a replacement origin for a granitic mass, and I daresay that if an equivalent degree of evidence were required to prove the conventional intrusive origin of many granite bodies, or their modes of emplacement, or even the shapes of the masses, not a little of our accepted geologic mapping and interpretations would be in the condition of needing subsequent confirmation of preconceived notions. Certainly there are places where, regardless of the completeness of the data obtained in the field, or at least cited by authors—that is to say, the number of criteria satisfied—neither forcible intrusion nor stoping, nor quiet upwelling of magma could be supported by certain inherent structures and relationships. Incidentally, since when have the modes of emplacement and shapes of granite batholiths been unequivocably established?

Some other statements in Grout's paper cannot be passed by without brief comment. If taken judiciously his paper will serve a very useful purpose and be truly helpful. But he says that recent writers assume the process to be established, and carry their idea too far, applying it to masses several miles across. It is my contention that "granitization" is no longer merely an assumed process, but is established by as clear data and as cogent reasoning as the hydrothermal origin of ore deposits was, when it was widely accepted as a sound and established theory. The effects *are* discernible over large areas—they may, indeed, be manifest regionally in all degrees from incipient feldspathization to the formation of "igneous-looking" rocks. It seems to be largely the term "granitization" that offers the quarrel. Actually the process is one of igneous metamorphism in a broad sense, and if it happens that, by a very simple mineralogic change and the operations of a well-established process the resulting rock resembles a granite to a considerable extent, it is because the original composition, texture, and other local geologic conditions were together favorable to that end point. With other rocks to work upon, quite different appearing rocks would have resulted for the most part, although rocks of granitic composition would still be the theoretical end product wherever sialic solutions were the agents.

[19] Anderson, G. H., *Granitization, albitization, and related phenomena in the northern Inyo Range of California-Nevada*. Bull. Geol. Soc. Amer. 48(1): 1–74. Jan. 1, 1937.

[20] Grout, F. F., *Formation of igneous-looking rocks by metasomatism; a critical review and suggested research*. Bull. Geol. Soc. Amer. 52(10): 1525–1576. Oct. 1, 1941.

In places the results of intensive granitization are restricted to the shells or aureoles of recognizable magmatic granites that may reasonably be held accountable for the transformation. To require the discovery of a responsible magmatic body, however, is to require fulfillment of an oftentimes unfulfillable condition, besides placing a serious restriction on the exercising of legitimate scientific imagination.

One statement in Grout's paper particularly worries me. At the end of a paragraph that outlines the various steps necessary to prove acceptably a case of granitization, he says, "Finally, there should be a careful discussion by experts in the various branches of geology which might bear on the conclusion." This is a rather formidable prospect, even aside from the mere task of assembling the opinions of such a group of the learned fraternity. Can't you picture an eager, well-trained, and keen-minded young geologist working in an area and finding himself confronted with a granite-looking rock that defies orthodox pigeon-holing? What's his next step? And how does he go about prevailing upon these categorically right-minded individuals to come scurrying to his aid? And then what does he do after the consultation of doctors has taken place, and the smoke of intellectual battle has finally cleared? Chances are that he'll still have to weigh the evidence and figure out the answer himself. In his fundamental training, however, he should be provided with a broad enough viewpoint to realize that the theory of metasomatic feldspathization on a large scale is rational and well founded, and is valuable heritage from deservedly renowned scientists. In spite of his implied fear that too many geologists will overstep the bounds of conventional geologic propriety, Professor Grout does indeed present students with a broad-minded concept, for in his valuable and comprehensive text on petrology[21] he makes the following statement: "If a granite magma is introduced into massive quartzites and so disseminated that its channels of access are not visible, it may so largely replace the original as to form a rock indistinguishable from granite. Some intermediate stages in this series of replacement effects suggest that certain large masses of granite may be really results of replacement." He seems just a bit overcautious and discouraging in his 1941 paper, but he has a righteous quarrel with vague terminology.

A review of the literature leads to the view that most complete granitization takes place in rocks of highly siliceous character, particularly the impure quartzites. This suggests that comparatively little quartz is added in the process; some of it appears as myrmikitic replacement of feldspar. It would seem, too, that some alumina may be added as aluminous silicates, for the alumina content of many impure quartzites is rarely high enough, by several per cent, to equal the requirements of a granitic composition. Potash and soda are introduced, but some of the potash is derived from the sediment itself. Some titanium becomes fixed as titanite.

Highly calcareous beds may develop a labradorite or bytownite and pyribole-zoisite facies under equivalent conditions, that is clearly suggestive of a contact-metamorphic origin, but may not be closer to a contact zone with truly igneous material than other parts of the granitized facies. The term "regional contact metamorphism" has been applied by some geologists to the regional metamorphism by igneous agencies acting over a large area, including facies that are granitized products.

Fine-grained argillites, such as phyllites, are relatively compact, and though they are susceptible chemically they are not permeated so easily as are the coarser-grained sediments. Their incompetency promotes squeezing and flowage rather than the development of shatter fractures and porosity, and the metamorphic minerals in them may be more completely derived from the inherent rock constituents under increased thermal gradient than is true of the more competent formations. Even the phyllites, however, show the penetrative effects of hydrothermal solutions. For example, a low-to-medium-grade phyllite in eastern Vermont showed saddle-shaped replacement grains of feldspar on the crests

[21] GROUT, F. F., *Petrography and petrology, a textbook*. New York, 1932.

of minute crinkles. These feldspar grains are neither fractured nor distorted, and they penetrate the rock folia on both limbs of the minute folds; trains of tourmaline crystals occupy the fracture cleavages in the axial planes. Small lenses and veins of hydrothermal quartz are abundant in the formation.

Igneous rocks also are susceptible, but like sedimentary rocks the original composition influences the completeness of "granitization." Gilluly described an outstanding example,[32] in which a quartz diorite was changed to albite granite. He gives a summary of the microscopic evidence that suggests replacement; similar mineralogic and textural features are duplicated in the Chelmsford granite, and other replacement granites derived from siliceous sediments.

Replacement granites commonly have a pseudoporphyritic texture. Porphyroblasts of oligoclase or albite-oligoclase are commonly formed as metasomes during the first wave of invasion. These are succeeded by the development of potash feldspar in the groundmass, and these in turn by albite and myrmikitic quartz. The textures are predominantly metasomatic.

In the New England area such metasomatic phenomena range from incipient feldspathization of low-grade rocks to what appears to be one of the most striking examples of replacement granite on record, that in the Westford-Chelmsford area, Massachusetts. Broad, roughly parallel zones both of metamorphic grades and of hydrothermal invasion are suggested by the areal distribution of facies. I shall outline briefly my concept of these zones. It is to be emphasized, however, that they cannot be sharply delineated or separated completely from one another. A great deal more detailed mapping is needed to demonstrate the gradations and complexities, but it already seems clear that the grade zones of metamorphism are not susceptible to separation by boundaries as simple as might be expected of a sequence determined purely by depth-zone control. Instead of a simple gradational system the zones overlap and intermingle in detail, as indeed one might expect where invasive agencies have been operative and the metamorphism is a function not only of depth but also of belts of deformation and subjacent intrusion.

It is interesting to note that Billings has abandoned, apparently, his earlier method of mapping depth zones according to Grubenmann's classification of epi-, meso-, and katazones, and that he favors simple grade-zone nomenclature for the rocks of New Hampshire. In his paper on the White Mountains area he shows mineralized subzones, and says "The subzones of metamorphism of the Mt. Washington area result from variations in the metamorphic history in different sections. There is no evidence that the subzones were buried at different depths. The temperature, however, may well have been different from place to place"[33] and, "The gneisses of the Mt. Washington area formed by processes identical to those postulated for central Massachusetts by Larsen and Morris (1923). The process is similar to that described by Currier (1937) in the Chelmsford-Westford district of Massachusetts and at Milford, New Hampshire."[34]

Briefly, the picture that seems to be shaping up is as follows. From the Green Mountains axis the metamorphic grade increases in general toward the east and southeast, and three major zones appear.

(*a*) A zone of low-grade metamorphism in central and eastern Vermont and western Massachusetts, in which quartz and quartz-ankerite veins are abundant, and pegmatites are relatively sparse and small.

(*b*) East of the low-grade zone a belt of medium and high-grade metamorphism that swings southwesterly into and across Connecticut, and northeasterly through east-central New Hampshire into Maine. This zone includes the prominent pegmatite belt of New Hampshire, central Massachusetts, and western Maine; it also includes most of the migmatitic domes that are com-

[32] GILLULY, JAMES, *Replacement origin of the albite granite near Sparta, Oregon.* U. S. Geol. Surv. Prof. Paper 175: 65–81. 1933.

[33] BILLINGS, M. P., *Structure and metamorphism in the Mt. Washington area, New Hampshire.* Bull. Geol. Soc. Amer. 52: 924. 1941.

[34] *Ibid.*, p. 931.

mon in western New Hampshire, and central Massachusetts. In this general zone medium and high-grade facies of metamorphic rocks are complexly related.

(*c*) Generally east and south of zone *b*, a belt that is dominated by relatively coarse-grained granites, gneissic granites, and paragneisses. Most of the known granite stocks and "batholiths" of Maine and Massachusetts, particularly those granites of coarse texture, lie in the coastal part of this belt.

A map of known granite bodies that are clearly intrusive shows that they are distributed widely through all three belts. Granite bodies in the coastal area are predominantly stocklike, and among them are most of the relatively coarse-grained granites, such as those of the Jonesboro, Mt. Desert, Stonington (Deer Isle), Vinalhaven, Biddeford, and Kennebunkport districts in Maine, and the Rockport, Peabody, and Quincy districts of Massachusetts. The finer-grained granites are more common farther inland, and, except for a few occurrences, as at Redstone, New Hampshire, the granites of this area are fine to medium grained and occur predominantly as sills, dikes, and small stocklike masses; examples of these granites are to be seen in the Fitzwilliam, Troy, Milford, and Concord districts of New Hampshire, and the Acton, Carlisle, and Fitchburg districts of Massachusetts. Note that from this catalog are excluded the markedly gneissic granites whose origins and forms are not certain, or that show strong evidences of migmatitization. In central and eastern Vermont also are many granite intrusives which, for the most part, are relatively small bodies and whose textures are fine to medium grained. Examples of these granites are those known commercially as the Barre, Bethel and Woodbury granites. It is noteworthy that the intrusives of zones *a* and *b* have had little apparent metamorphic effect upon the enclosing rocks, and that associated pegmatites are comparatively small and few.

The age relations of the metamorphic, invasive, and intrusive phenomena are not completely established. For New Hampshire, Billings interprets at least three ages of intrusive rocks; of these the late Devonian intrusives—his New Hampshire magma series—were associated with a period of major deformation, and he believes that there was no comparable episode of deformation in the Carboniferous period or at the close of the Paleozoic era. In Massachusetts the migmatitic rocks and pegmatites of the medium and high-grade belt were assigned to the Carboniferous by Emerson[25] and others, on the basis of flora from the Worcester phyllite. There seems to be sufficient question, however, about this correlation to warrant a reexamination of the fossils. If the fossils should prove to be assignable to the Devonian, the apparent anomaly of Carboniferous or post-Carboniferous migmatitization in Massachusetts disappears. Also the problem of the apparently anomalous lithology of the Boston and Narragansett Basins—which are underlain by comparatively unmetamorphosed Carboniferous sediments—will also be resolved. The rocks of these basins interrupt the continuity of the coastal belt of highly intruded and metamorphosed rocks.

The Chelmsford granite is believed to represent the metasomatic replacement of schistose quartzitic beds of the Merrimack quartzite, in the belt of gneissic granites and paragneisses. This formation is correlated with the Oakdale quartzite of the Worcester area, a formation below the Worcester phyllite, and separated from the phyllite by the Harvard conglomerate. The strata above and below the Merrimack quartzite are highly invaded by pegmatites and replacement veins. The "Chelmsford granite" is well exposed by quarries and by natural exposures through a belt 15 miles long and up to 2½ miles wide, trending northeasterly across the Lowell, Tyngsboro, Westford, and Ayer quadrangles of northeastern Massachusetts. The best exposures and quarries are in the town of Westford. The outcrop belt conforms perfectly with the general regional trend of the sedimentary formations, that is, N.

[25] EMERSON, B. K., *Geology of Massachusetts and Rhode Island*. U. S. Geol. Surv. Bull. 597. 1917.

40° to 45° E. The northeastern and southwestern limits of the granite have not yet been determined closely, but the mass thins gradually in these directions. The end zones as well as the border zones are indefinite, and are intercalated with the bordering schists in various degrees of migmatitization.

The granite is well "banded." In most places the "bands" or layers (believed to be relicts of original bedding) are distinct, thin, remarkably uniform and persistent; in some places the layers are less distinct but still definite, and in still other places, notably on the crests and troughs of folds, the layers are vague or even wanting. Several folds can be traced within the granite, and a schistosity superimposed on the "bedding" is parallel with the axial planes, and so cuts across the layers at a very sharp angle. These features are exposed well in the larger quarries of the district in one of which several folds have been traced and mapped. The remarkable uniformity and persistence of the layers, the folding, and the parallelism of the superposed schistosity with the axial planes are considered to be strong evidence of the derivation of this granite from a sedimentary schist. Such structures could not result from either plastic or liquid flow.

Schist and quartzite inclusions in the granite, to be seen in several of the quarries, are oriented parallel with the layering and in accord with the regional structure. Most of the inclusions are of biotite schist, representing a reconstitution of the original rock, and range from elongated masses with metasomes and thin irregular layers of feldspar to mere shreds of biotite that gradually fade out along the strike into the granitic rock. A few of the inclusions are of relatively dense and pure quartzite; they have irregular but comparatively sharp contacts with the granite.

The granite is cut by countless thin pegmatite veins, rarely more than a foot thick, and mostly but a few inches thick. Commonly these veins cross the layers at a large angle; their comblike crystals of feldspar and muscovite, however, are continuous with the foliation of the host rock and are therefore not perpendicular to the walls of the veins. The contacts are irregular and vague. Pegmatite veinlets of a later generation are also present; they have sharp contacts and in places contain abundant black tourmaline.

It is not my purpose at this time to present the details of evidence for a metasomatic origin of the granite. Such is planned for a later and more specific paper. But the mineralogic features, textures, and structures that characterize the Chelmsford granite are to be found in all degrees of development throughout the metamorphic zones of New England, and it seems necessary to consider the so-called "granitization" as a regional metamorphic process—a gradational phenomenon that has left its impress upon rocks of all grades, and whose manifestations range from incipiency to dominancy in the reconstitution and recrystallization of the rocks, regionally as well as locally. The theory of granitization cannot be looked upon as a fad. It is a basic concept, and must be a common and legitimate recourse for the metamorphic geologist.

BOTANY.—A new species of *Elsinoë* on capulín cherry (*Prunus capuli*).[1] ANNA E. JENKINS, U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering.

On January 4, 1940, a leaf spot caused by *Elsinoë* (*4*) was discovered on capulín cherry (*Prunus capuli* Cav.) growing in the nursery at the Estación Experimental Central, Ministerio de Agricultura y Cria, at Caracas, Venezuela, by M. F. Barrus, of Cornell University, then on sabbatical leave in Venezuela, and by A. S. Muller, then plant pathologist at the Station. Specimens were transmitted to the writer with the

[1] Received December 6, 1946.

statement that the diseased tree had recently been introduced from Mexico. It is possible that the tree was already infected in Mexico, where the capulín is said to have originated (cf. *6*, note by S. F. Blake, p. 58, and *8*).

The lesions produced by the *Elsinoë* were large and conspicuous and ascomata were prominent on them. The conidial stage was rare on the specimen collected in January but was abundant on a specimen from the same source, collected on March 1, 1941, by Dr. Muller. In this case the perfect stage was not seen. The fungus appears to be new and is described as follows:

Elsinoë pruni, n. sp. (Fig. 1)

Leaf spots conspicuous, few to numerous, as many as 50 on a leaf, scattered, sometimes marginal, circular to subcircular, minute to 5 mm in diameter, coalescent, usually in small groups, up to 5 mm in diam., above, "vinaceous-buff"[2] to gray, including "pale mouse gray," or whitish, sometimes shading to brown including "deep vinaceous-brown," margin slightly raised, even to finely undulate, brown to purple, including "Mars violet," below brown often shading to purple, including "dull dark purple," fructifications of the fungus appearing as dark pustules on the spots; ascomata numerous, up to 60 on an individual spot, pulvinate, with rounded margin, black, up to 200μ or more in diam., by 60–80μ in thickness, arising intraepidermally, then becoming erumpent, covered with a dark epithecium reaching 15μ in thickness, sometimes coalescent; asci numerous, subglobose to broadly ovoid or pyriform, 22–30 by 16–22μ; ascospores fusiform-elliptical, straight or slightly curved, becoming 3-septate, slightly constricted at the median septum, hyaline, 14–18 by 6–8μ.

Imperfect stage, *Sphaceloma pruni*, n. sp.

Fructifications conspicuously rupturing the epidermis, becoming erumpent-superficial, circular to irregular, or elongate, reaching 500μ in length by 200μ in width, coalescent or branching olivaceous to nearly black, at first in the form of an acervulus, then sometimes becoming sporodochial, often about 50μ in thickness, the palisade of colored conidiophores usually at least 14μ thick, individual conidiophores 3–5μ in diam., often pointed at the tip, sometimes elongating, hypha-like from conidia remaining in situ, or otherwise, continuous or septate, occasionally geniculate; conidia minute, spherical, hyaline, to narrowly ovoid or fusiform-elliptical, dusky, up to 15 by 2.6–5μ.

Maculae in foliis, superne conspicuores, paucae usque numerosae, conspersae vel marginales, circulares vel subcirculares, aliquando paucae coalescentes, usque 5 mm in diam., supra vinaceo-bubalinae usque grisae vel albidae interdum brunnescentes, margine subelevato, integro ad subleniter undulato, brunneo-purpurascenti, inferne brunneo-purpurascenti, ascomata numerosa, pulvinata, atra, usque 200μ in diam. et 60–80μ crassa; epithecium usque 15μ crassus; asci in massis pseudoparenchymoides numerosi, subglobosi ad late ovoidei vel pyriformes, 22–30 by 16–20μ; ascosporae fusiform-ellipticae, hyalinae, 3-septatae et septum medium paulo constructae, 14–18 $\times$ 6–8μ.

Status conidicus, *Sphaceloma pruni*, n. sp.

Fructificationes conspicue epidermidem perfringentes, erumpentes et superficiales, circulares ad irregulares vel elongatae, usque 500 $\times$ 200μ, olivaceae ad atrae, in forma acervuli vel sporodochii, saepe ca. 50μ in diam.; pali conidiophorum obscuri, ad minimum 14μ crassi; conidiophora 3–5μ in diam., interdum supra palos se protrahendentia, hyphoidea; conidia minuta, sphaeroidea, ad angusta ovoidea vel fusiform-elliptica, fusca, usque 15–2.6–5μ.[3]

Distribution.—Producing the disease "anthracnose of capulín cherry" (*Prunus capuli* Cav.) (Rosaceae) in Venezuela, South America.

Specimens examined.[4]—PERFECT STAGE: On leaves of *Prunus capuli*, Caracus, Sta. Federal, Venezuela, January 4, 1940, M. F. Barrus and A. S. Muller (HV 3763, IB 4193, CU 31760,

[2] Colors in quotation marks are based on Ridgway (*7*).

[3] Translation into Latin by Miss Edith K. Cash.

[4] Symbols indicating the herbaria in which these specimens are deposited are as follows:

HV	Herb. Micol. Exp. Central., Min. Agr. e Cria, Caraças, Venezuela
IB	Secc. Fitopat., Inst. Biol., São Paulo, Brazil
CU	Cornell Univ. Plant Path. Herb., Ithaca, N. Y.
USM	Mycol. Coll., Bur. Plant Indus., Soils, and Agr. Engineering, U. S. Dept. Agr., Plant Industry Station, Beltsville, Md.

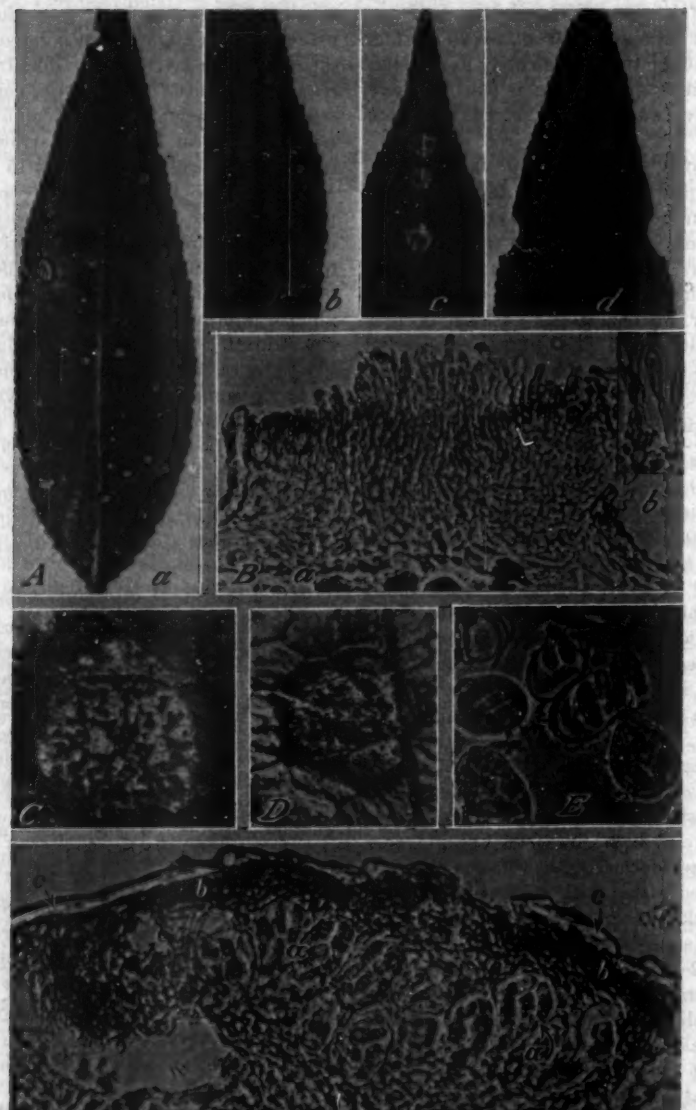

FIG. 1.—*A*, Leaf spot caused by *Elsinoë pruni* on capulín cherry from Caracas, Venezuela, *a* and *b*, collected on March 1, 1941, by A. S. Muller; *c* and *d*, on January 4, 1940, by M. F. Barrus and A. S. Muller; all ×1. *B*, *C*, Conidial stage (*Sphaceloma*) on specimen collected in March, *C*, abundant fructifications on light-colored central area of an individual spot (×13), *B*, *a*, acervulus in section and *B*, *b*, individual conidiophores and conidia from another section (×500). *D–F*, Perfect stage on specimen collected in January, *D*, individual leaf spot with ascomata showing as dark-colored pustules on the central area (×7), *E*, asci (*a*, *b*), containing ascospores (*c*) (×500), *F*, an ascoma with numerous asci (*a*), *b*, darkened peripheral region, *c*, outer wall of ruptured epidermis (×500). Photographs by M. L. F. Foubert.

USM 73419 Type); June 16, 1940, A. S. Muller (HV 3904, IB 4107, CU 31761, USM 74118).

IMPERFECT STAGE: On leaves of *Prunus capuli* Cav., Caracas, Sta. Caracas, Sta. Federal, Venezuela, March 1, 1941, A. S. Muller (IB 4194, USM 73780 Type).

Note.—Relative to *Sphaceloma* on other species of *Prunus* than *P. capuli*, it has previously been inferred (*2*, p. 263) that Garbowski's (*1*) report of *Hadrotrichum populi* Sacc. on plum (*P. domestica* L.) from the peninsula Crimea (south Russia) concerns a *Sphaceloma* on that host. (*H. populi* is, of course, the *Sphaceloma* of poplar (*Populus*), now known as *S. populi* (Sacc.) Jenkins (*2*, p. 264). Unfortunately, a specimen of the so-called *Hadrotrichum* on plum is not available as Garbowski informed the writer in 1930. In the abstract reporting the *Sphaceloma* on capulín cherry (*3*), reference is made to *Sphaceloma* on chokecherry (*P. virginiana* L.) It is here explained that the lesions on the chokecherry leaves strongly suggested the presence of *Sphaceloma*, but absolute evidence of the existence of the fungus on them has not been obtained. Until further data are available, therefore, this record should be regarded as provisional. Similarly, lesions from their appearance attributable to *Sphaceloma* (or *Elsinoë*) are present on a certain specimen of hollyleaf cherry (*P. ilicifolia* (Nutt.) Walp.) and of Catalina cherry (*P. lyonii* (Eastw.) Sarg.) from California (*5*).

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ENTOMOLOGY.—*A new species of* Culex *from New Guinea (Diptera, Culicidae).*[1]

ALAN STONE, U. S. Bureau of Entomology and Plant Quarantine, and GEORGE HENRY PENN, Cornell University.

For some time the writers have had before them a *Culex* quite different in coloration from any previously described except *C. binigrolineatus* Knight and Rozeboom,[2] and differing from that species in the male genitalia, the larva, and the pupa. Like *binigrolineatus*, the larva of this species is found in the leaf axils of the sago palm (as well as other plants), and the females of the two species are scarcely distinguishable. Because it is desired to refer to this species in other papers on the mosquito fauna of New Guinea, it is being described at this time.

[1] Received December 2, 1946.

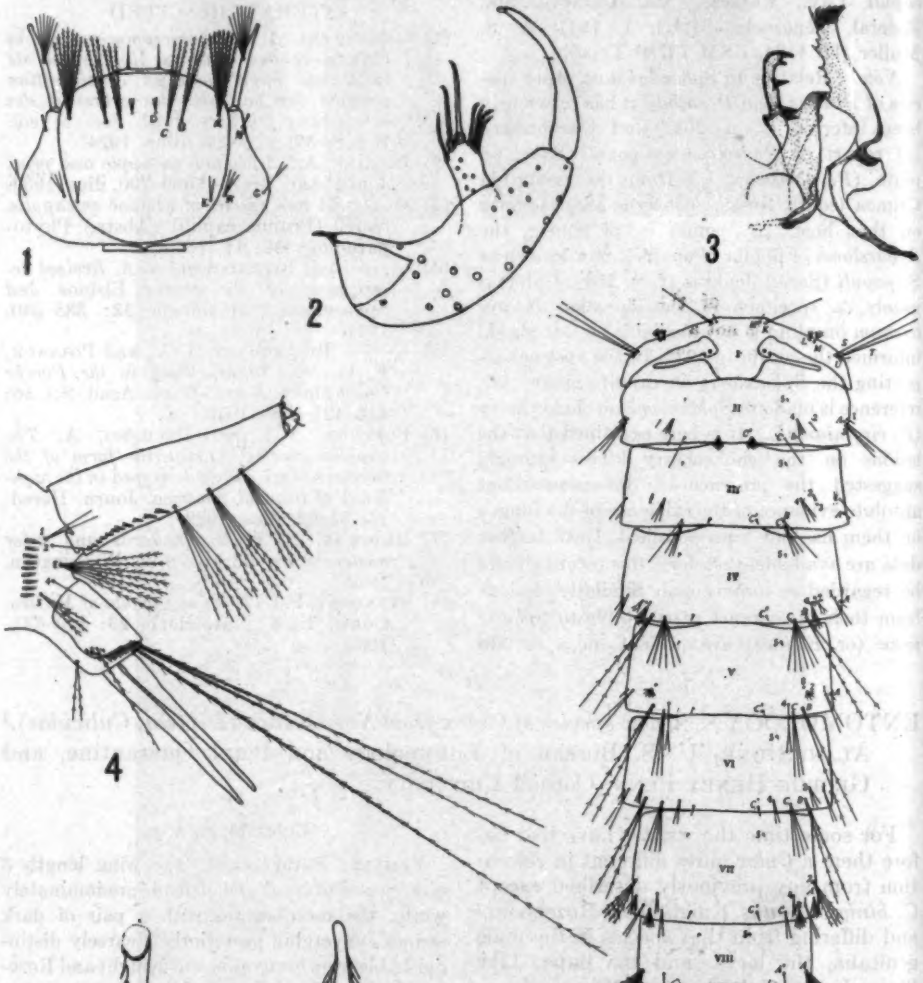
[2] Proc. Ent. Soc. Washington **47** (9): 289–295. 1945.

Culex bicki, n. sp.

FEMALE: Rather small, the wing length 3 mm. Scales of head and scutum predominately white, the mesoscutum with a pair of dark stripes converging posteriorly. Scarcely distinguishable from *binigrolineatus* Knight and Rozeboom, the only observed difference being that the bare portions of the dark mesoscutal stripes are less apparent, the dark bronzy-brown scales being more evident.

MALE: Coloration as in female. Long ventral hairs of proboscis not forming a tuft before middle, as in *binigrolineatus*, but scattered on apical half. Antenna scarcely shorter than proboscis, and palpus longer than proboscis by no more than half of the fifth segment. Otherwise as in *binigrolineatus* externally. *Genitalia* (Figs,

2, 3). Basistyle conical, without scales, but with a number of long hairs on lateral and dorsal surfaces. Subapical lobe rather large, with two stout filaments and about five smaller setae. Dististyle slender, tapering, a minute seta beyond middle, the terminal spine very short,



FIGS. 1–7.—*Culex bicki*, n. sp.: 1, Head of larva; 2, basistyle and dististyle of male genitalia; 3, lateral plate of mesosome and tenth sternite; 4, apex of abdomen of larva; 5, pecten tooth; 6, comb scale; 7, abdomen of pupa.

broad. Lateral plates of mesosome with five (rarely more) stout teeth on upper arm, two apical, two basal, and one median (the holotype has three teeth in the apical group of one of the arms); lower arm projecting obliquely with the apex truncate. Inner edge of tenth sternite with a row of irregular denticles, the apex with a number of slender, curved spines; basal arm short, stout, curved. Ninth tergite simple, without lobes, evenly clothed with long hairs.

LARVA: *Head* (Fig. 1). Shape and color as in *binigrolineatus*, differing only in the following characters: Antennal tuft consisting of 7 to 10 long, nonplumose hairs, situated between 0.6 and 0.7 length of segment from base; anteantennal tuft (A) finely plumose, 5- to 8-branched, usually 7; lower and upper head hairs (B and C) finely plumose, 2- to 4-branched, usually 3; posterior clypeal tuft (D) short, 2- to 3-branched, usually 3; inner occipital hair (E) 2-branched; outer occipital hair (F) 3- to 4-branched, usually 3; orbital hair (G) single or forked beyond middle; and, subantennal hair (H) inconspicuous, usually single.

Abdomen (Figs. 4, 5, 6). Similar to that of *binigrolineatus*, differing chiefly in having the comb teeth of segment VIII in a straight line, consisting of 8 to 11 teeth, usually 9; teeth each with a central blunt spine fringed on either side by 9 or 10 fine, short hairs. Pentad hairs of VIII: 1 usually 2-branched, range from 1 to 3; 2 and 4 always single; 3 finely plumose, 6- to 10-branched, usually 7; 5 finely plumose, 2- to 4-branched, usually 3. Siphon like that of *binigrolineatus* in shape and color, pecten averaging 11 teeth with a range of 10 to 14; 3 pairs of siphonal tufts, 3- to 6-branched, usually 5, finely plumose apically. Anal segment as in *binigrolineatus* except ventral brush which usually consists of a pair of bifid, finely plumose hairs.

PUPA: *Cephalothorax*. Shape and pigmentation as in *binigrolineatus*. Hair 2 prominent, 3- to 4-branched, slightly plumose; hair 10 usually 3-branched; 11 single, prominent; 12 usually 3-branched.

Abdomen (Fig. 7). Segments II and VIII well pigmented as well as the "bridge" between the float hairs on segment I. Differs conspicuously from *binigrolineatus* in that only the larger posterolateral hairs of abdominal segments IV-VIII are finely plumose, all others being nonplumose. All hairs of segment I nonplumose, H, S, and T being the strongest developed; segments II and III without any conspicuously well-developed hairs; segments IV-VI with hair B large, 2-branched and finely plumose, and C large, multibranched and nonplumose; segment VII with hair 2 most prominent, 4-branched, and finely plumose; segment VIII with hair A 9-branched and finely plumose. Paddles without apical hairs, but lateral margin finely serrate and tip slightly notched beyond midrib; midrib weak not reaching hind margin of paddle, which is very thin apically and often difficult to discern without special lighting; paddle sometimes with an irregular line of black pigment near base.

MATERIAL STUDIED: *Holotype:* Male, reared from larva in sago axil, Toem, Dutch New Guinea, VII-17-1944, Edward S. Ross. *Paratypes:* Same locality and collector: 2♂♂, 2♀♀, same data as holotype; 3♂♂, 2♀♀, from taro, (?) VI-1944, 1♀, 23 larvae, from sago axils, VI-30-1944; 1♀, VII-10-1944. Hilimoi, Milne Bay, Papua, 1♂, 5♀♀, with four associated larval skins and six associated pupal skins, ex *Pandanus* leaf axil, IX-12-1944, George H. Bick (through G. H. Penn, Elizabeth N. Marks, and T. K. Ruebush); Milne Bay, Papua, in thick jungle, 1944, Yves Guillory (through Elizabeth N. Marks). Holotype and paratypes, United States National Museum No. 58245. Other paratypes to be deposited at Cornell University, University of Queensland, California Academy of Sciences, and the British Museum.

We are indebted to the collectors and those who submitted this material to us for the opportunity of describing this interesting species.

TAXONOMIC POSITION: The assignment of this species to any of the described subgenera is difficult. Knight and Roseboom tentatively placed the closely related *binigrolineatus* in the subgenus *Neoculex*, although admitting that the only reason for not treating it as a *Culiciomyia* was the absence of modified bristles on the male palpus. There are, however, translucent bristles on the ventral surface of the palpus that are not so modified as in *Culiciomyia* species. These two species, *binigrolineatus* and *bicki*, along with two undescribed species from the Solomon Islands, form a rather distinct species group that will probably warrant the erection of a new subgenus.

ENTOMOLOGY.—*A new genus of flea beetles from the West Indies.*[1] DORIS H. BLAKE, Arlington, Va.

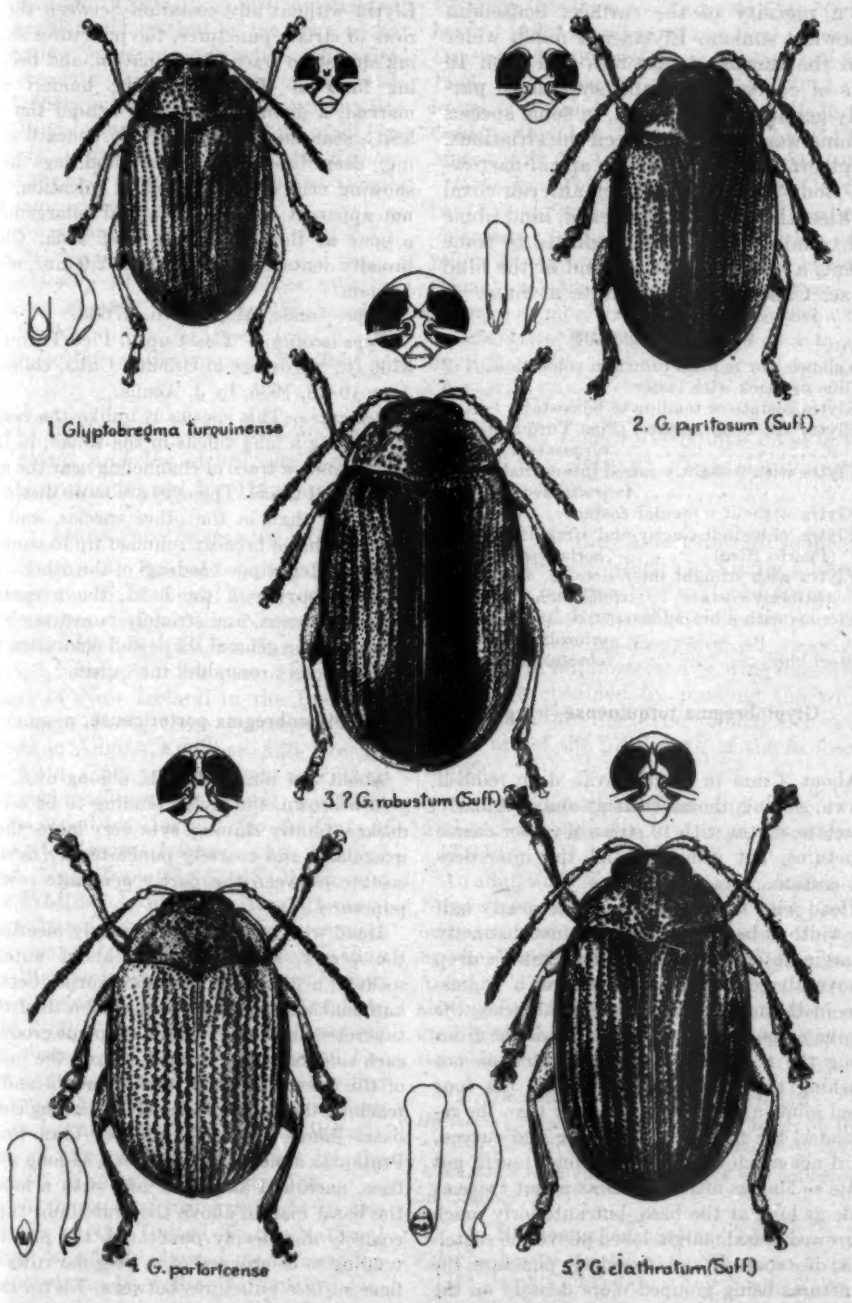
Two new species of a genus of flea beetles that has hitherto gone without a name have recently been collected, one from the region of the Pico Turquino, in Oriente Province, Cuba, the second, the only one of its group from outside of Cuba, from Puerto Rico.

In his treatment of the Cuban Chrysomelidae, Suffrian[2] grouped under *Haltica* such related genera as "*Graptodera, Crepidodera, Phyllotreta,* and *Aphthona*" and others. Frequently, under a section head designated merely by a letter, he described, without giving a name to it, a group that did not belong under any of the genera known to him. Such a group is that characterized in a brief Latin description under section *c* (p. 187) of his treatment of *Haltica.* Following this short generic description he described four species, *H. interstitialis, clathrata, pyritosa,* and *robusta.* Of *H. interstitialis* he remarked that in habit and color it reminded him of a species of *Helophorus,* a water beetle, belonging to a wholly unrelated group. He also compared it with species of *Phratora* (*Phytodecta*) but stated that it definitely did not belong to that genus, being a halticid. In Gemminger and Harold's Catalogue (vol. 12, 1876, pp. 3496–3497) these four species were placed under *Disonycha.* Heikertinger in the Junk Catalogue followed Harold's arrangement, leaving them still in that genus. Except for their broadly oblong oval shape and the short legs with the small spur at the end of the tibiae, there is not much resemblance to *Disonycha.* In fact, they are not very closely related to any halticid with which I am familiar. Their short broad thorax and large eyes suggest some species of *Dibolia* or *Megistops,* but they lack the large double spur at the end of the hind tibia. They have three outstanding characteristics that separate them from any related genera—(1) the peculiar carving of the head, consisting of a deep groove on either side along the margin of the eye, (2) the lobing at the middle of the base of the thorax, and (3) the deep, striate, often partially geminate, punctation of the elytra, which tends to produce interstitial costae. This combination of characters makes these six species unique enough to deserve generic separation. The name **Glyptobregma** is proposed for the group. (γλυπτός carved, βρέγμα forehead). *Glyptobregma portoricensis* is selected as the type of the genus.

Of Suffrian's species I can identify only *H. pyritosa* with complete assurance. The late Dr. E. A. Schwarz identified a series of specimens that he collected at Cayamas, Cuba, as *H. interstitialis.* Suffrian differentiated *interstitialis* and *clathrata* by the difference in development of the elytral costae, which in *interstitialis* were uniform and in *clathrata* (Fig. 5) unequally developed (the 2nd, 4th, and 6th being stronger than the others). In Schwarz's series, which seems to be clearly one species, both forms are found. I have separated them in the key on the basis of Suffrian's description, being unwilling to unite them without some knowledge of the types. I have only two females from Las Animas, Sierra Rangel, that I refer with some doubt to *robusta* (Fig. 3). Suffrian described the species as steely blue with the breast and outside of the legs bluish. These have a bluish luster and are reddish brown beneath without any blue, and they are slightly larger than Suffrian's measurements. Specimens from Cayamas, Santa Clara Province, Cuba, identified as *pyritosa* by Schwarz, agree with Suffrian's description of that species.

Description of the genus.—3–5 mm in length, oblong oval, not very convex. Head with large and in some species very closely placed eyes, a small pit between the frontal tubercles, and on either side a deep furrow extending along the inner margin and in some species around the eye. Antennae not reaching the middle of the elytra, the basal joint long and curved. Thorax, short and greatly broadened behind with the basal margin lobed over the scutellum; coarsely and deeply punctate, the punctures occurring in groups or irregular rows and produc-

[1] Received December 20, 1946.
[2] Arch. für Naturg. 34 (pt. 1): 176, 1868.



FIGS. 1–5.—*Glyptobregma*, n. gen.: 1, *G. turquinense*, n. sp.; 2, *G. pyritosum* (Suffrian); 3, *? G. robustum* (Suffrian); 4, *G. portoricense*, n. sp.; 5, *? G. clathratum* (Suffrian).

ing a rugosity of the surface. Scutellum somewhat sunken. Elytra not much wider than the thorax, rather flat, and with 10 rows of coarse, deep, and sometimes partially geminate punctation, in some species forming weak costae between the striations. Epipleura extending only to apical narrowing. Body beneath with open anterior coxal cavities. Hind femora thickened, hind tibiae and usually middle tibiae sulcate to some extent, a short spur at the end of the hind tibiae. Claws broadly dentate at base.

KEY TO THE SPECIES

1. Yellowish or reddish brown in coloration....2
   Blue or black with luster.....5
2. Elytra costate or tending to be costate.....3
   Elytra not at all costate, (Pico Turquino).... .....*turquinense*, n. sp.
3. Elytra with 9 slightly raised interstitial costae .....*interstitiale* (Suffrian)
   Elytra without 9 regular costae.....4
4. Elytra only indistinctly and irregular costate (Puerto Rico).....*portoricense*, n. sp.
   Elytra with straight interstices (2, 4, 6) more distinctly costate.....*clathratum* (Suffrian)
5. Piceous with a brassy luster..... .....*pyritosum* (Suffrian)
   Steel blue.....*robustum* (Suffrian)

Glyptobregma turquinense, n. sp.

FIG. 1

About 3 mm in length, oval, deep reddish brown, shining, thorax coarsely and irregularly punctate, elytra with 10 striae of rather coarse punctures, not geminate and the interstices not costate.

Head with the interocular space nearly half the width of head, eyes large but not distinctly emarginate near the antennal sockets, a deep groove above antennal sockets and a depression in the middle between the tubercles, the groove extending up on each side of the front along the margin of the eyes. Antennae not reaching the middle of the elytra, the four basal joints a little lighter in color than the remainder, the first joint very long and curved, third not much longer than second, fourth not quite so long as fifth. Prothorax about twice as wide as long at the base, but anteriorly much narrowed, basal margin lobed above the scutellum; disc coarsely and irregularly punctate, the punctures being grouped more densely on the sides and forming thereby a more depressed area on either side near the basal margin. Elytra without any costation between the 10 rows of striate punctures, the punctures showing almost no trace of gemination, and becoming finer in the apical half; humeri well marked, a distinct depression behind the callosity near the scutellum. Body beneath shining, deep brown; tibiae of hind legs alone showing near the apex a slight sulcation, this not apparent beyond the apical enlargement; a spur at the end of the hind tibia. Claws broadly dentate at base. Length 2.9 mm; width 1.6 mm.

Type.—male, M.C.Z. No. 27663.

Type locality.—"Coast up to Pico Turquino, 3700 ft.," Province of Oriente, Cuba, collected June 10–29, 1936, by J. Acuña.

Remarks.—This species is unlike the rest in not having a long sulcus in the tibiae; in fact, there is only a trace of channeling near the apex of the hind tibiae. The eyes are more distinctly separated than in the other species, and the aedeagus has a broadly rounded tip in contrast to the acutely tipped aedeagi of the others. But in the grooving of the head, the irregularly punctate thorax, and striately punctate elytra, as well as the general shape and coloration this species closely resembles the others.

Glyptobregma portoricense, n. sp.

FIG. 4

About 3–4 mm in length, oblong oval, pale yellow-brown, the elytra tending to be a little darker, faintly shining, eyes very large, thorax irregularly and coarsely punctate, elytra semicostate between the partly geminate rows of punctures.

Head with enormous eyes nearly meeting at the vertex, and emarginate about antennal sockets; a distinctly produced carina between antennal sockets, and a pit between the frontal tubercles, and above them a deep-cut groove on each side extending up and around the margin of the eyes. Antennae reddish brown and not reaching the middle of the elytra, a long curved basal joint, third joint shorter than fourth. Prothorax almost twice as broad as long at the base, narrowed anteriorly and with a lobe on the basal margin above the scutellum; surface coarsely and deeply punctured, the punctures tending to be grouped or in irregular rows with finer surface punctures between. Elytra rather flat with smooth shining humeri and 10 rows of partially geminate, coarse, deep punctures,

producing an irregular costate appearance, more regular and marked at the apex; a few fine shallow punctures apparent on the sides. Body beneath shining reddish or yellowish brown, finely pubescent. Anterior coxal cavities open. Hind femora thickened, tibiae of all legs shallowly furrowed, hind tibiae with a short spur at the end, claws broadly dentate. Length 3–4.4 mm; width 1.7–2.5 mm.

Type male and 36 paratypes (2, in M.C.Z.), U.S.N.M. No. 58259.

Type locality.—Ponce, Puerto Rico, collected December 30, 1932, on *Quercus thompsoni* by R. G. Oakley.

Other localities.—Bayamon, P.R., July 14, 1934, on *Jasminum* sp.; Orocovis, P.R., October 25, 1932, on unknown tree, and Orocovis, December 22, 1932, on *Quercus thompsoni;* San Juan, P.R., Ponce, September 21, 1933, on leaves of *Tabebuia* sp., all collected by R. G. Oakley. Guanica, P.R., collected by C. M. Matos, July 25, 1914 (Stuart Danforth coll.).

Remarks.—This species closely resembles the two Cuban species, *G. interstitiale* and *G. clathratum* (Suffrian), being of the same pale yellow brown coloration and with a broadly oblong oval shape and very large eyes. It differs in its more irregularly and less distinctly costate elytra. The aedeagus has a more tapering tip.

ORNITHOLOGY.—*A report on the birds collected by Logan J. Bennett on Nissan Island and the Admiralty Islands.*[1]

S. DILLON RIPLEY, Yale University.
(Communicated by HERBERT FRIEDMANN.)

I. BIRDS FROM NISSAN ISLAND

Dr. Logan J. Bennett during his war service in the U. S. Naval Reserve had occasion to be stationed on Nissan Island, sometimes called Sir Charles Hardy Island, which lies nearly 60 miles east of the southern part of New Ireland in the Bismarck Archipelago. Forty-three specimens were collected in August, October, and November of 1944. Only two previous collections have been made on this Island; by Eichhorn, recorded by Hartert (*On the birds of Feni and Nissan Islands, east of New Ireland,* Nov. Zool. 33: 33–48. 1926), and by the Whitney Expedition. Hartert noted the fact that the avifauna of Nissan is more closely related to the Solomon Islands than to the Bismarck Archipelago. In only four of the subspecific forms of the immediate area is Nissan populated by a Bismarck rather than a Solomon Island form. For that reason the island is usually classified zoogeographically as one of the northern Solomon Islands. It is also listed politically as part of the northern Solomons by the Australian Mandate Administration.

I wish to express my gratitude to the authorities of the United States National Museum, who have allowed me to examine these specimens, as well as to the Bird Department of the American Museum of Natural History, which has kindly allowed me to use comparative material from the Whitney and Rothschild Collections.

In the following discussion all measurements are in millimeters. The wing measurements are obtained by pressing the wing flat against the ruler. The culmen measurements are of the full length of the exposed culmen.

1. Demigretta sacra sacra (Gmelin)

Ardea sacra Gmelin, Syst. Nat. 1, pt. 2: 640. 1789 (Tahiti).

An adult male in dark plumage was taken on November 2. This species had not been previously recorded from Nissan by Hartert (*l.c.*) or by the Whitney Expedition (*vide* Mayr and Amadon, Amer. Mus. Nov., no. 1144. 1941), although it is bound to occur on every reef and atoll in the area. This specimen is completing the molt.

2. Haliastur indus girrenera (Vieillot)

Haliaetus girrenera Vieillot, Gal. Ois. 1: 31, pl. 10. 1822. ("India"; restricted to new South Wales).

An adult male in worn plumage was collected on October 28.

3. Haliaeetus leucogaster (Gmelin)

Falco leucogaster Gmelin, Syst. Nat. 1, pt. 1: 257 1788 (locality unknown; = New South Wales).

A male adult taken on October 30 is the first record for the Solomon Islands and represents

[1] Received November 11, 1946.

an incursion of typical Bismarck Archipelago fauna. The wing measurement is 501 mm. This specimen is molting the tail feathers.

4. **Megapodius freycinet eremita** Hartlaub

Megapodius eremita Hartlaub, Proc. Zool. Soc. London 1867: 830. 1867 (Echiquier Island).

Two males collected on August 20 and November 11 have wing measurements of 216, 221.

5. **Pluvialis dominica fulva** (Gmelin)

Charadrius fulvus Gmelin, Syst. Nat. 1, pt. 2: 687. 1789 (Tahiti).

Two males and a female were taken in October and November. The males have traces of dark feathers on the belly.

6. **Numenius phaeopus variegatus** (Scopoli)

Tantalus variegatus Scopoli, Del. Flor. et Faun. Insubr., fasc. 2: 92. 1786 (Luzon).

A male collected in August of this common migrant is a new record for the Island.

7. **Actitis hypoleucos** (Linnaeus)

Tringa Hypoleucos Linnaeus, Syst. Nat., ed. 10, 1: 149. 1758 (Europe; Sweden).

Two females were shot in August and November.

8. **Heteroscelis incanus brevipes** (Vieillot)

Totanus brevipes Vieillot, Nouv. Dict. Hist. Nat. 6: 410. 1816 (no locality; Timor).

A female was taken in November.

9. **Arenaria interpres interpres** (Linnaeus)

Tringa interpres Linnaeus, Syst. Nat., ed. 10, 1: 148. 1758 (Europe; Gotland, Sweden).

Two females in winter plumage were collected in November.

10. **Sterna hirundo longipennis** Nordmann

Sterna longipennis Nordmann, *in* Erman's Verz. Thier. Pflanz.: 17. 1837 (mouth of Kutchni River, Sea of Okhotsk).

A pair were shot in November. Both are in fairly worn eclipse plumage.

11. **Sterna sumatrana sumatrana** Raffles

Sterna Sumatrana Raffles, Trans. Linn. Soc. London 13, pt. 2: 329. 1822 (Sumatra).

Two males were taken in November. There is no notation as to whether this species breeds on the Island.

12. **Ptilinopus solomonensis neumanni** Hartert

Ptilinopus solomonensis neumanni Hartert, Nov. Zool. 33: 42. 1926 (Nissan Island).

Two males of this endemic race, taken in August and November, have wing measurements of 128, 129.5. The November bird is molting. This race is readily distinguishable from *solomonensis*, not only by larger size but also by the noticeably paler lilac crown.

13. **Ducula pistrinaria pistrinaria** Bonaparte

Ducula pistrinaria Bonaparte, Consp. Av. 2: 34. 1855 (St. George, Solomon Islands).

As Hartert noted (*l.c.*, pp. 34–35), there is a tendency for northern Solomon Islands birds to approach *Ducula p. vanwyckii* of New Ireland. In fact, there seems to be a continuous cline in coloration running in a rough arc from Bougainville to the northeast through Nissan, Feni, probably Tanga, Lihir, and the mainland of New Ireland itself. The backs of Solomon Islands birds are gray-green. Two individuals in the Whitney series from Bougainville have a somewhat less grayish, more greenish suffusion in the color of the back. This tendency is more pronounced in Nissan birds, fully half of which in the combined U.S.N.M. and A.M.N.H. series have a distinctly greenish suffusion. Birds from Feni in the American Museum collection carry the greenish still further, although they still show a strong grayish tint. This cline culminates in birds from Lihir Island, which previously has been included in the range of *p. pistrinaria* (*vide* Peters, *Check-list of birds of the world* 3: 48. 1937). Three specimens in the Whitney collection of the A.M.N.H. have backs so strongly greenish in tone, so lacking in gray, that I believe that the population of this Island should be included in *vanwyckii*. Birds from Feni and Nissan should be maintained in *pistrinaria*, as there is no strong break in the cline of color. However, a somewhat complicating factor is that Nissan birds show a slight size difference compared to the populations from the rest of the Solomons. Their measurements, including three males taken by Bennett in August, are as follows:

	wing	tail	culmen
Nissan Island	8 ♂♂ 246–257 (250.5)	150–159 (154.7)	25.5–27 (26.2)
Feni Island	7 ♂♂ 238–252.5 (245.5)	149–161 (155.2)	22–24.5 (23.5)
Bougainville and other Solomons	11 ♂♂ 237–253 (243.5)	144–153.5 (149.3)	23–26 (24.1)

The measurements show that Nissan birds, following the trend of small island populations, have longer bills than birds from the larger islands of the Solomons, but that the population from Feni to the north has definitely shorter bills. In this measurement the Feni birds possibly reflect a cline toward the Lihir and New Ireland population, which has short bills (23.5, 24, etc.). I should hazard the theory that Feni birds express not only a cline in color and size but also a swamping effect, and that Nissan has the most isolated population of the entire group. These differences, of course, are microspeciational in the sense that they can only be talked or written about but not described in taxonomic terms.

This species belongs to the *Ducula aenea* assemblage. A speciation study of the whole group would be most interesting.

14. **Macropygia mackinlayi arossi** Tristram

Macropygia arossi Tristram, Ibis, 1879: 443 (Makira Harbor, San Cristobal Island).

A male and female taken in August measure; wing ♂ 139.5, ♀ 144; tail ♂ 159, ♀ 161; culmen ♂ 12.5, ♀ 12.

15. **Caloenas nicobarica nicobarica** (Linnaeus)

Columba nicobarica Linnaeus, Syst. Nat., ed. 10, 1: 164. 1758 (Nicobar Islands).

Two males were taken in October and November.

16. **Eos cardinalis** (Gray)

Lorius cardinalis Gray, Gen. Birds 3: app., p. 20. 1849. (Solomon Islands).

A male was collected in August.

17. **Trichoglossus haematodus massena** Bonaparte

Trichoglossus massena Bonaparte, Rev. et Mag. Zool. 6: 157. 1854 (Polynesian Islands).

Two males and a female were taken in August and October. One August female has almost obsolete blackish bands on the vermilion breast. These birds run large in size as would be expected from a small island population: wing ♂ 141, 144.5, ♀ 137.5.

18. **Collocalia esculenta becki** Mayr

Collocalia esculenta becki Mayr, Amer. Mus. Nov. no. 486: 16. 1931 (Florida Island, Solomon Islands).

Two males were taken in August and November; the former example has more white on the abdomen than the November bird. Mayr (*cit. supra*) writes of Nissan birds that they are similar to typical *becki;* but with more white on the belly and more greenish above. This description fits our two birds. The present examples are somewhat smaller than Mayr's minimal measurements, having wings of 91 and 93 respectively (his smallest wing length being 96).

19. **Halcyon chloris bennetti,** n. subsp.

Characters.—Similar to *Halcyon chloris nusae* Heinroth but differing in having a longer bill, traces of buff on the lower flanks, and in being less blackish on the upper parts, especially on the crown.

From *novaehiberniae* Hartert of New Ireland, this race differs in having a longer bill, by the lack of any pronounced edging to the breast feathers, and in being more greenish, less blackish on the crown and upper parts. The upper wing coverts and axillaries of *bennetti* also are more bluish, less suffused with green.

Compared to *alberti* Rothschild and Hartert, of the northern Solomons, (Bougainville, Fauro, Kolombangara, etc.) this race differs in the size of the bill and in the color of the lower parts, which are more whitish, less buffy, in the paler whitish nuchal collar, and presumably in the more greenish upper parts.

Only two specimens have been available from Nissan Island where this species is recorded for the first time, but in these two birds the tail measurement also is slightly longer than in any other specimens measured of the races enumerated above.

Type.—U.S.N.M. no. 377009, male adult collected on Nissan Island, August 22, 1944, by Logan J. Bennett.

Measurements.—bennetti: Males (2 specimens), wing 107, 109, tail 71.5, 73.5, culmen 49.5, 48. *nusae:* Male, wing 108, tail 69, culmen 46. Female, wing 111.5, tail 69.5, culmen 46. *novaehiberniae:* Male, wing, 104, tail 70, culmen 43. Female, wing 98.5, tail 64, columen 41. *alberti:* Males (4 specimens) 105–109 (106.9), tail 64.5–70 (67.2), culmen 40.5–45 (42.7). Female: wing 105, tail 68, culmen 47.5.

Mayr (Amer. Mus. Nov. no. 828: p. 6. 1936) gives extensive measurements for *alberti,* of which the above are only a small sample. There is considerable variation in size in this subspecies throughout the Solomons as he points out. However, birds from the immediately adjacent

northern Solomons are considerably smaller than these Nissan birds, and in addition males of *alberti* have the underparts bright rufous, to buffy rufous in some cases. These Nissan males are much more reminiscent of the color of Solomon Islands females, a trait that emphasizes the disappearance of the rufous or buffy underparts in the males of the related subspecies in the Bismarck Archipelago.

This new race is named for the collector.

20. **Halcyon saurophaga saurophaga** Gould

Halcyon saurophaga (Gould, Zool. Voy. *Sulphur* **1**: 39, p. 19. 1843 (New Guinea).

Two males, taken in August and November, do not show any of the blackish spots as noted by Hartert (*l.c.*, p. 45) in his series.

21. **Monarcha cinerascens impediens** Hartert

Monarcha cinerascens impediens Hartert, Nov. Zool. **33**: 40. 1926 (Feni Island).

Two females were taken in August and October. They measure; wing 84, 85; tail 73, 73.5; culmen 18, 18.5. These birds seem similar to specimens from nearby Ontong Java, although possibly they are very slightly paler on the lower parts.

22. **Pachycephala pectoralis dahli** Reichenow

Pachycephala melanura dahli Reichenow, Orn. Monatsb., 1897: 178 (Credner Island).

Two males in fresh plumage were collected in August. The wings of these specimens measure 91, 92.

23. **Aplonis feadensis feadensis** (Ramsay)

Calornis feadensis Ramsay, Journ. Linn. Soc. London, Zool., **16**: 129. 1881 (Fead Island, Solomon Group).

A pair of this large-billed form were taken in August and October. Measurements: wing ♂ 123, ♀ 121.5; culmen ♂ 22, ♀ 23.

24. **Zosterops griseotincta eichhorni** Hartert

Zosterops eichhorni Hartert, Nov. Zool. **33**: 48. 1926 (Nissan Island).

A pair of this little-known form was collected in August.

II. BIRDS FROM THE ADMIRALTY ISLANDS

The Admiralty Islands had been visited by three expeditions prior to World War II, and two papers have appeared devoted to these collections alone (*The birds of the Admiralty Islands, north of New Guinea,* by Rothschild and Hartert, Nov. Zool. 21. 1914, and *On the birds of the Admiralty Islands*, by Sclater, Proc. Zool. Soc., London, June 1877). The Whitney Expedition for the American Museum of Natural History collected on several of the Islands, but no complete report has as yet been issued on these collections.

Dr. Bennett as well as others in the Naval Service visited and collected on these Islands during the course of the war, and it is to be expected that several papers will eventually appear devoted to the avifauna of this group. Dr. Bennett collected on several of the Islands at different dates during 1945, as follows:

1. Los Negros, an island to the northeast and immediately adjacent to Manus, the principal island of the group This island has never been collected on previously. Specimens were taken during all months from February through July.

2. Manus, the largest and best known from the avifaunal point of view, still has a relatively large area of untrodden high interior. Specimens were taken here in March, April, and May.

3. Pityili, an islet in a small group west of the northern tip of Los Negros. It has presumably never been collected on before. Some specimens were collected here in April and May.

4. Hauwei, another islet just west of Los Negros, has also probably never been collected on before. Specimens were taken here in March.

5. Ponam, the westernmost of the group of islands running along the north coast of Manus, and west of the tip of Los Negros. Specimens were taken on this previously uncollected island in July.

6. Herringan (also called Harengen or Koruniat), another islet in the Los Negros chain. It has presumably never been previously collected on. Specimens were taken in April.

7, 8. Luo and Butyo Islands, visited by the collector in May, not readily identifiable. I presume that Butyo is an abbreviation for Rambutyo and Luo is another spelling for Lou or St. George Island near Rambutyo and to the north. Rambutyo was visited by the Whitney Expedition.

1. **Fregata ariel ariel** (Gray)

Atagen Ariel (Gray), Genera of birds **3**: col. pl. [185]. 1845 (Raine Island).

A subadult male was taken in February on Los Negros. The label has a notation "uncommon."

2. **Demigretta sacra sacra** (Gmelin)

Ardea sacra Gmelin, Syst. Nat. **1**, pt. 2: 640. 1789 (Tahiti).

Two males and a female were collected on Manus and Los Negros. A male and female are in the dark bluish plumage with white throats. The single Manus male is in the white plumage. The female taken in February in molting the primaries. The species is noted as "common."

3. **Dupetor flavicollis gouldi** (Bonaparte)

Ardetta gouldi Bonaparte, Consp. Av. **2**: 132. 1855 (New South Wales).

An adult male and a subadult female from Los Negros agree in measurements with those given by Mayr for Admiralty Islands birds (Amer. Mus. Nov., no. 1294: 5. 1945). The male is molting the head feathers in February.

4. **Anas superciliosa pelewensis** Hartlaub and Finsch

Anas superciliosa var. *pelewensis* Hartlaub and Finsch, Proc. Zool. Soc. London, 1872: 108 (Pelew Islands).

A pair from Los Negros have wing measurements of: ♂ 249, ♀ 228.5, which are slightly larger than any given by Amadon (Amer. Mus. Nov. no. 1237. 1943), in his survey of specimens from the approximate area (Bismarck Archipelago). The species is noted as "fairly common." The species had not been previously recorded from the Admiralties.

5. **Haliastur indus girrenera** (Vieillot)

Haliaetus girrenera Vieillot, Gal. Ois. **1**: 31, pl. 10. 1822 (India; restricted to New South Wales).

A male and a female were collected on Manus and Los Negros.

6. **Accipiter novaehollandiae dampieri** (Gurney)

Urospizias dampieri Gurney, Ibis, 1822: 453 (New Britain).

A male and a female from Los Negros measure: wing ♂ 212, ♀ 245. The birds were collected in March and noted as "common."

7. **Pandion haliaetus melvillensis** Mathews

Pandion haliaetus melvillensis Mathews, Austr. Av. Rec. **1**: 34. 1912 (Melville Island, Northern Territory).

Two females from Manus and Los Negros are in fresh plumage in April and May. They were noted as "common."

8. **Megapodius freycinet eremita** Hartlaub

Megapodius eremita Hartlaub, Proc. Zool. Soc. London, 1867: 830 (Echiquier Island).

Two males from Pityili and Los Negros have wing measurements of 212, 216. The birds were described as "common." The Pityili specimen in its more brownish coloration is reminiscent of *M. f. affinis*.

9. **Rallus philippensis admiralitatis** (Stresemann)

Hypotaenidia philippensis admiralitatis Stresemann, Orn. Monatsb., 1929: 190 (Manns, Admiralty Islands).

A male of this form, which is rare in museum collections, was taken on Pityili in April. The wing measures 141.5. The specimen is in rather worn plumage.

10. **Porphyrio porphyrio ellioti** Salvadori

Porphyrio ellioti Salvadori, Atti Acad. Sci. Torino, 1879: 1168 (Admiralty Islands).

A male, two females, and an immature female were collected on Los Negros. The species was noted as "abundant." The iris of the young bird is noted as "greenish gray." The adults have wing measurements of; ♂ 232, ♀ 216. One female is in extreme wing molt in February and would appear to have been quite flightless.

11. **Pluvialis dominica fulva** (Gmelin)

Charadrius fulvus Gmelin, Syst. Nat. **1**, pt. 2: 687. 1789 (Tahiti).

A pair were taken on Hauwei. The male shows traces of black feathers on the abdomen.

12. **Numenius phaeopus variegatus** (Scopoli)

Tantalus variegatus Scopoli, Del. Flor. et Faun. Insubr., fasc. **2**: 92. 1786 (Luzón).

A male and two females were taken on Pityili and Los Negros.

13. **Actitis hypoleucos** (Linnaeus)

Tringa Hypoleucos Linnaeus, Syst. Nat., ed. 10, **1**: 149. 1758 (Europe; Sweden).

A female was collected on Los Negros in March.

14. **Heteroscelus incanus brevipes** (Vieillot)

Totanus brevipes Vieillot, Nouv. Dict. Hist. Nat. **6**: 410. 1816 (no locality: Timor).

Two specimens were taken on Los Negros in February and March.

15. **Arenaria interpres interpres** (Linnaeus)

Tringa interpres Linnaeus, Syst. Nat., ed. 10, 1: 148. 1758 (Europe; Gotland, Sweden).

A female in winter plumage was secured on Hauwei.

16. **Sterna hirundo longipennis** Nordmann

Sterna longipennis Nordmann, *in* Erman's Verz. Thier. Pflanz.: 17. 1835 (mouth of Kutchui River, sea of Okhotsk).

Two females from Hauwei add this widespread species to the Admiralty Islands fauna.

17. **Sterna sumatrana sumatrana** Raffles

Sterna Sumatrana Raffles, Trans. Linn. Soc. London 13, pt. 2: 329. 1822 (Sumatra).

A pair taken on Hauwei serves as another addition to the Admiralty Islands fauna.

18. **Thalasseus bergii cristatus** (Stephens)

Sterna cristata Stephens, *in* Shaw's Genl. Zool. 13, pt. 1: 146. 1826 (China).

Three birds, of which one female is in breeding plumage, were collected on Los Negros and Hauwei in February, March, and June. According to the labels the species is "common."

19. **Anous tenuirostris minutus** Boie

Anous minutus Boie, Isis, 1844, col. 188 (New Holland = Raine Island, Australia).

Two males were collected on Los Negros in February.

20. **Ptilinopus superbus superbus** (Temminck)

Columba Superba Temminck, *in* Knip, Les Pigeons. Les Colombes: 75, pl. 33. 1810 (Halmahera).

Three males and two females were taken on Los Negros in March and May. The species is listed as "rare." A May female is molting the primaries. Wing: ♂ 129, 136, 142; ♀ 135.

21. **Ptilinopus solomonensis johannis** Sclater

Ptilinopus johannis Sclater, Proc. Zool. Soc. London, 1877, 556 (Wild and D'Entrecasteaux Islands, Admiralty Islands).

Three males and two females were collected on Los Negros, Pityili and Ponam. The species was noted as "common" on Los Negros and "rare" on Pityili. Wing measurements of these specimens are: ♂ 118.5, 120, 123; ♀ 115, 119.5.

22. **Ducula pistrinaria rhodinolaema** (Sclater)

Carpophaga rhodinolaema Sclater, Proc. Zool. Soc. London, 1877: 555 (Admiralty Islands).

Two males and a female were taken on Los Negros in March. The species is listed as "common." One male is molting. Wing measurements: ♂ 234, 238.5; ♀ 227.

23. **Chalcophaps stephani stephani** Pucheran

Chalcophaps stephani Pucheran, Voy. Pôle Sud., Zool. 3: 119; Atlas, pl. 28, fig. 2. 1853 (Triton Bay, New Guinea).

A male from Pityili is described as "rare." The wing measurement is 137.5.

24. **Caloenas nicobarica nicobarica** (Linnaeus)

Columba nicobarica Linnaeus, Syst. Nat., ed. 10, 1: 164. 1758 (Nicobar Islands).

A male was collected on Los Negros in March. This specimen is molting the head feathers.

25. **Trichoglossus haematodus flavicans** Cabanis and Reichenow

Trichoglossus flavicans Cabanis and Reichenow, Sitzungsber. Ges. Naturf. Freunde Berlin, 1876: 73 (New Hanover).

Two males and three females were taken in April and May on Los Negros, Pityili, and Luo. The male from Luo has a strong reddish-purplish infusion on the feathers of the lower abdomen. Wing measurements of these specimens are: ♂ 152, 154, ♀ 143, 145, 150.

26. **Micropsitta meeki meeki** Rothschild and Hartert

Micropsitta meeki Rothschild and Hartert, Bull. Brit. Orn. Club 33: 107. 1914 (Manus, Admiralty Islands).

Four males of this interesting species were secured on Los Negros in May. They measure: wing 59.5, 60.5, 61, 61.5; tail 26.5–28.5; culmen (excluding cere) 9–9.5.

27. **Lorius roratus goodsoni** Hartert

Lorius roratus goodsoni Hartert, Nov. Zool. 31: 123. 1924 (Manus, Admiralty Islands).

Four males and two females from Los Negros in March are recorded as "common." Two males are molting. The series measures: wing ♂ 252, 255, ♀ 231, 238; culmen ♂ 44–45.5, ♀ 39, 40.5.

28. **Ninox meeki** Rothschild and Hartert

Ninox meeki Rothschild and Hartert, Bull. Brit. Orn. Club. 33: 105. 1914 (Manus, Admiralty Islands).

A pair of this rare owl and an immature male were collected on Los Negros in May and July. The immature specimen (May) is in partially downy plumage, especially on the head, neck, and flanks. The downy plumage is rather pale buffy, ranging to deep tawny on the nape. The wings and tail are colored as in the adult female. In the original description Rothschild and Hartert did not note that the underparts of the adult male tend to be more heavily streaked than in the female. Wing measurements: ♂ 224, ♀ 233.

29. **Collocalia esculenta stresemanni** Rothschild and Hartert

Collocalia esculenta stresemanni Rothschild and Hartert, Nov. Zool. 21: 293. 1914 (Manus, Admiralty Islands).

A single male from Los Negros was taken June 14. The wing measurement is 95.

30. **Collocalia vanikorensis coultasi** Mayr

Collocalia vanikorensis coultasi Mayr, Amer. Mus. Nov., no. 915: 7. 1937 (Malai Bay, Manus, Admiralty Islands).

One male, taken on Los Negros, March 6, 1945, appears to extend the known range of this swiftlet, previously recorded only from Manus Island. The specimen has been compared with the type and paratypes of *coultasi* by Dr. Mayr, who writes that it agrees with them in every detail.

31. **Collocalia spodiopygia eichhorni** Hartert

Collocalia francina eichhorni Hartert, Nov. Zool. 31 (2): 269. 1924. (St. Matthias Island, nw. of New Hanover.)

One female, taken on Los Negros, February 9, 1945, adds this species to the Admiralty avifauna. This specimen was submitted to Dr. Ernst Mayr, who writes that it is of this species and probably not separable from *eichhorni*.

32. **Hemiprocne mystacea aeroplanes** Stresemann

Hemiprocne mystacea aeroplanes Stresemann, Ann. Orn. Ges. Bayern, no. 5: 38. 1921 (Blanche Bay, New Britain).

Two males and one female were collected on Manus and Los Negros in March and April. The female is molting on the throat. The males have wing measurements of: 225, 227.5.

33. **Alcedo atthis hispidoides** Lesson

Alcedo hispidoides Lesson, Compl. de Buffon 9: 345. 1837 (Buru).

A female from Los Negros, taken in April, has a wing measurement of 72.

34. **Halcyon saurophaga admiralitatis** Sharpe

Halcyon admiralitatis Sharpe, Cat. Birds Brit. Mus. 17: 251. 1892 (Admiralty Islands).

Two males and a female were collected on Hauwei. These specimens measure: wing ♂ 119.5, 121.5, ♀ 121.5. One of the males is molting the wing coverts.

35. **Halcyon sancta sancta** Vigors and Horsfield

Halcyon sanctus Vigors and Horsfield, Trans. Linn. Soc. London 15: 206. 1826 (Australia).

Three specimens from Los Negros and Pityili in May and July are apparently the first records from the Admiralties for this common migrant.

36. **Cacomantis variolosus blandus** Rothschild and Hartert

Cacomantis blandus Rothschild and Hartert, Nov. Zool. 21: 290. 1914 (Manus Island, Admiralty Group).

A male and a female were taken on Manus and Pityili. They measure: wing ♂ 113, ♀ 113.5. The form is noted as being "fairly common" on Pityili.

37. **Coracina papuensis ingens** (Rothschild and Hartert)

Graucalus papuensis ingens Rothschild and Hartert, Bull. Brit. Orn. Club 33: 107. 1914 (Manus, Admiralty Islands).

Two males from Manus and Los Negros, collected in February and March, measure; wing 167, 169.

38. **Rhipidura setosa niveiventris** Rothschild and Hartert

Rhipidura setosa niveiventris Rothschild and Hartert, Bull. Brit. Orn. Club. 33: 109, 1914 (Manus Admiralty Islands).

Males and females were taken on Los Negros in February, March, April, and May. These birds have wing measurements of: ♂ 89–89.5, ♀ 84, 87. None show signs of molt.

39. **Rhipidura rufifrons semirubra** Sclater

Rhipidura semirubra Sclater, Proc. Zool. Soc. London, 1877: 552 (Admiralty Islands).

Two males from Los Negros in March meas-

ure: wing 69, 70.5. This is the most brilliantly colored race of the species.

40. Monarcha alecto chalybeocephalus (Garnier)

Muscicapa chalybeocephalus Garnier, Voy. *Coquille*, zool., Atlas, pl. 15, fig. 1, i, 589. 1826–28 (New Ireland).

Males and a female of this very widespread form were taken on Los Negros, Luo, and Ponam in March, May, and July. They measure: wing ♂ 89, 90, ♀ 82.

41. Monarcha cinerascens subsp.

Three males from Herringan and Pityili, taken in April measure: wing 88.5 (2), 90; tail 77.5, 78.5, 79; culmen 19, 20. Birds from the Admiralties and Hermit Islands evidently represent a condition of exact intermediacy in color between the pale, buff-bellied *Monarcha c. perpallidus* Neumann of New Ireland, New Hanover, St. Matthias and Squally Islands, the Tabar Group and Lihir, and the dark, rufous-bellied *M. c. impediens* Hartert of Witu, Feni, and Nissan. In size they are larger than these subspecies. As Dr. Mayr has had a paper in process of publication for some time on these forms, based on the extensive material in the Whitney and Rothschild collections, I prefer to leave the subspecific identification in his hands.

42. Monarcha barbatus infelix Sclater

Monarcha infelix Sclater, Proc. Zool. Soc. London, 1877: 552 (Admiralty Islands).

Three males and a female were taken on Los Negros in February, March, and May. The wings of these males measure: 80.5, 83.5, 84.5; culmen 15–16. This is a strikingly patterned form.

43. Pachycephala pectoralis goodsoni Hartert

Pachycephala pectoralis goodsoni Hartert, Nov. Zool. **21**: 296. 1914 (Manus, Admiralty Islands)

Two adults and an immature male were taken on Los Negros in February (immature) and May. The adults measure: wing ♂ 91, 93; culmen ♂ 17, 18.

44. Aplonis metallicus purpureiceps (Salvadori)

Calornis purpureiceps Salvadori, Atti Accad. Sci. Torino **13**: 535. 1878 (Admiralty Islands).

Adults and immatures were secured in February, March, and May on Los Negros. February and March adults are molting. These birds measure: wing ad. ♂ 104, ♀ 102, 104; tail ♂ 82, ♀ 75, 79; culmen ♂ 18, ♀ 17.5, 18.

45. Nectarinia jugularis flavigastra Gould

Nectarinia flavigastra Gould, Proc. Zool. Soc. London, 1843: 103 (New Ireland).

Two males and two females were collected on Butyo and Los Negros in February, March, and May. The March female is in a postjuvenal plumage distinguished by somewhat more fluffy, olivaceous feathers on the head and nape. The wing feathers and scapulars are slightly more faded-looking and brownish than in the adult.

46. Myzomela nigrita pammelaena Sclater

Myzomela pammelaena Sclater, Proc. Zool. Soc. London, 1877: 553 (Admiralty Islands).

Two males and a female were taken on Hauwei and Ponam. They measure: wing ♂ 75, 75.5, ♀ 67.5; culmen ♂ 17.5 (2).

47. Philemon albitorques Sclater

Philemon albitorques Sclater, Proc. Zool. Soc. London, 1877: 553 (Admiralty Islands).

A pair of this large endemic Admiralty Island species were collected on Los Negros in February and March. The female (March) is commencing the molt. These birds measure: wing ♂ 185, ♀ 179; culmen ♂ 48, ♀ 44. Old specimens, even after only 15 years (Whitney collection), become foxed, particularly on the forehead and crown, but also on the back, although Whitney specimens are not so foxed in this respect as are those of the Rothschild collection.

ORNITHOLOGY.—*The races of the violet-crowned hummingbird,* Amazilia violiceps.[1] ALEXANDER WETMORE, Smithsonian Institution.

When Ludlow Griscom (Bull. Mus. Comp. Zoöl. **75**: 378. Jan. 1934) determined that the type specimen of *Cyanomyia salvini* Brewster (Auk **10**: 214. July 1893), described from a bird taken at Nacozari, Sonora, was a hybrid between *Amazilia violiceps* and *Cynanthus latirostris* the status of the Arizona record of a hummingbird under the name *Amazilia salvini* (Brewster) in the fourth edition of the A.O.U. Check-list (1931: 183) was left undecided. The bird in question, from Palmerlee, Cochise County, Ariz., taken on July 4, 1905, was reported under the name *salvini* by Dr. Louis B. Bishop (Auk **23**: 337. 1906). It is now no. 160998 in the collection of the Chicago Natural History Museum. The officials of that institution have kindly lent it to me briefly for examination.

At the same time Dr. Max M. Peet has sent to me for identification a second specimen, from his collection, a male taken by H. H. Kimball near Paradise, Chiricahua Mountains, Ariz., July 16, 1905.

Both of these birds prove to be *Amazilia violiceps ellioti* and are to be recorded as that race, the supposed form *conjuncta* described by Griscom from Sonora proving to be a synonym.

Berlioz (Rev. Franç. Orn., 1932: 129–132, 533–534; 1938: 9–12) and Griscom (Bull. Mus. Comp. Zoöl. **75**: 376–378. Jan. 1934) have cleared up much of the confusion that has existed regarding individual variation in the present species and its geographic forms. Peters (Check-list Birds of the World **5**: 75. 1945) has followed Griscom's arrangement. Determination of the two Arizona specimens has necessitated an examination of the series of the entire species in the National Museum and the Museum of Comparative Zoölogy, with a somewhat different understanding of the forms and of the names that apply to them as a result. My findings are covered in the following brief synopsis, which agrees in the main with Berlioz's determination in 1932 (*l.c.*, p. 132), except that the form he designates *derneddei* is properly called *viridifrons*. The localities in the ranges given below are those of specimens I have handled personally.

[1] Received January 8, 1947.

Amazilia violiceps violiceps (Gould)

Cyanomyia violiceps Gould, Ann. Mag. Nat. Hist. (ser. 3) **4**: 97. Aug. 1859. (Oaxaca.)
Cyanomyia guerrerensis Salvin and Godman, Biologia Centrali-Americana **2**: 290. July 1892. (Rincón, Acahuitzotla, and Tierra Colorada, Guerrero.)
Uranomitra atricapilla Simon, Rev. Franç. Orn. **2**: 129. Aug. 7, 1911. (Oaxaca.)

Definitely shining and metallic above, the coloration of the dorsal surface being darker, the tail coppery color, and the edge of the wing brownish.

Chiapas (Ocozucuautla), Oaxaca (Santa Efigenia, Tapana), Guerrero (Acahuitzotla, Coquillo).

Gould described his bird from Oaxaca, so stating definitely in his original description. This is verified by Hartert (Cat. Birds Brit. Mus. **16**: 196. 1892) in his record of the type, which he says is from Oaxaca. In spite of this, Berlioz has spoken of the birds of Puebla as being typical, though actually they belong to another form, and Peters through a *lapsus calami* has listed the type locality of *violiceps* as Atlixco, Puebla.

Amazilia violiceps viridifrons (Elliot)

Cyanomyia viridifrons Elliot, Ann. Mag. Nat. Hist. (ser. 4) **8**: 267. Oct. 1871. (Putla, Puebla.)
Uranomitra Derneddei Simon, Rev. Franç. Orn. **2**: 129. Aug. 7, 1911. (Puebla.)

Similar to *violiceps* in the coppery iridescence of the tail and brownish edge of the wing, but duller, less metallic above, with the dorsal surface lighter, more brownish.

Puebla (Puebla), Morelos (Cuernavaca, Puente de Ixtla).

This bird is easily distinguished from the typical form on the characters given. The earliest name for it is *viridifrons* of Elliot. As no birds from the state of México are at hand, I am not certain whether they belong to this race or to *ellioti*.

Amazilia violiceps ellioti (Berlepsch)

Uranomitra ellioti Berlepsch, Proc. U. S. Nat. Mus. 9: 561. Sept. 25, 1889. (Mazatlán, Sinaloa.)

Amazilia violiceps conjuncta Griscom, Bull. Mus. Comp. Zoöl. 75: 377. Jan. 1934. (Álamos, Sonora.)

Similar to *violiceps* except that the tail is dull green, not coppery, and the edge of the wing is whitish.

Michoacán (La Salada, Los Reyes, Querándaro; Jalisco (Guadalajara, Etzatlán, Chapala, Bolaños, Barranca Ibarra); Sinaloa (Plomosas, Mazatlán); Sonora (Álamos, El Tigre Mine); Arizona (Palmerlee, Cochise County; near Paradise, Chiricahua Mountains).

On first examination of the two specimens from Arizona it was presumed that they were to be given the name *conjuncta* of Griscom, but on comparison of material in the U. S. National Museum the characters separating this supposed form from *ellioti* were not apparent. Subsequently J. L. Peters and I compared the original set of birds used by Griscom to find that the skins taken by Frazar that are the basis of *conjuncta* have the exact characters listed in the original description. Study of other specimens from the National Museum, however, showed that Frazar's skins have undergone a post-mortem fading, since material taken by later collectors, some of them from the same locality as Frazar's birds, were indistinguishable from typical *ellioti*. *A. v. conjuncta* therefore is a synonym of *ellioti*.

One specimen in the National Museum from La Salada, Michoacán, has a coppery-colored tail like *violiceps*, indicating some transition toward that form, but others from the same locality have normal green tails.

Birds from Chihuahua (not seen personally) supposedly belong here, but the limits of this race and *viridifrons* need to be established.

ORNITHOLOGY.—*Two new babblers (Timaliidae) from southeastern Asia.*[1]

H. G. Deignan, U. S. National Museum.

I

Through the kindness of the authorities of the Academy of Natural Sciences of Philadelphia and the American Museum of Natural History, I have been permitted to borrow comparative material that enables me to propose two new subspecies of babblers from Siam. The first may be known as—

Stachyris striolata nigrescentior, n. subsp.

Type.—Adult male, U.S.N.M. no. 169854, collected at elev. 2,000 feet on Khao Nok Ra, peninsular Siam at latitude 7°25′ N., longitude 99°55′ E., on January 15, 1899, by William L. Abbott.

Diagnosis.—Nearest *S. s. guttata* (Amherst District, Tenasserim) but distinguished by having the upper parts a darker russet brown; the guttate white spots of the upper back smaller and more numerous, especially at the center of the back; the white spots of the sides of the neck fringed with blackish brown rather than black.

The new race is very distinct from *S. s. umbrosa* (Deli District, northeastern Sumatra) by its *much* less nigrescent upperparts (a majority of my specimens show more or less blackish wash over the pileum, but not elsewhere) and the broader white drops on the upper back and sides of the neck.

No direct comparison has been possible with *S. s. striolata* (Padang Residencies, west central Sumatra). Robinson and Boden Kloss have defined it as much less nigrescent than *umbrosa*, but distinguishable from the bird of peninsular Siam by its more saturate coloration.

Range.—Peninsular Siam from Trang Province north to the Isthmus of Kra; southernmost Tenasserim.

Specimens examined.—S.s. helenae: 2; *S. s. guttata:* 3; *S. s. nigrescentior:* 12; *S. s. umbrosa:* 8.

II

The khatya of northwestern Siam, the Chin Hills of Burma, and presumably of Karenni proves to be racially distinct from the bird of the eastern Himalayas, with which it has been heretofore confused. I suggest that it be called—

[1] Published by permission of the Secretary of the Smithsonian Institution. Received January 24, 1947.

Cutia nipalensis melanchima, n. subsp.

Type.—Adult female, U.S.N.M. no. 330611, collected on Doi Langka (Khao Pha Cho), northern Siam at latitude 19°00′ N., longitude 99°25′ E., on November 6, 1930, by Hugh M. Smith (original number 4292).

Diagnosis.—Nearest *C. n. nipalensis* (Nepal), from which it is inseparable in the male but differs in the female by having the crown a deeper slate and the ground color of the mantle light brownish olive (Ridgway) more or less washed with ferruginous, rather than a uniform bright ferruginous.

From *C. n. cervinicrissa* (Perak) distinguished in either sex by the much lighter and less extensive buffy wash over the white under parts, and in the female by having the mantle distinctly washed with ferruginous.

From *C. n. legalleni* (southern Annam) easily separated in either sex by having the black barring of the under parts restricted to the sides of the body, and in the female by having the crown slate, not brown, and the mantle distinctly washed with ferruginous.

Range.—Northwestern Siam; Karenni?; Chin Hills.

Specimens examined.—*C. n. nipalensis:* 6 males, 6 females; *C. n. melanchima:* 6 males, 7 females; *C. n. cervinicrissa:* 1 male; *C. n. legalleni:* 8 males, 7 females.

Remarks.—In the ground color of the mantle in the female, *melanchima* is almost exactly intermediate between *nipalensis* on the one hand and *cervinicrissa* and *legalleni* on the other, as might be expected from its geographically intermediate range.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE ACADEMY

406TH MEETING OF THE BOARD OF MANAGERS

The 406th meeting of the Board of Managers was held in the Library of the Cosmos Club on Monday evening, February 17, 1947, President SCHMITT presiding. The following persons were present: H. S. RAPPLEYE, N. R. SMITH, F. M. SETZLER, W. N. FENTON, H. B. COLLINS, JR., W. W. DIEHL, F. G. BRICKWEDDE, F. L. MOHLER, J. S. WADE, C. F. W. MUESEBECK, W. W. RUBEY, L. E. YOCUM, W. A. DAYTON, C. A. BETTS, A. O. FOSTER, H. G. DORSEY, O. B. FRENCH, C. L. GAZIN, W. L. SCHMITT, and, by invitation: G. P. WALTON and A. STONE.

The following appointments were announced:

Appointed Members on the Executive Committee: N. R. SMITH and F. L. MOHLER.

Archivist: N. R. SMITH was reappointed for a term of three years.

Committee on Meetings: GEORGE P. WALTON, Chairman, G. W. VINAL, A. R. MERZ, E. H. GRAHAM, and S. F. HILDEBRAND.

Committee on Membership: W. W. DIEHL, Chairman, C. W. EMMONS, C. W. COOKE, J. W. MCBURNEY, E. W. PRICE, W. D. SUTCLIFFE, and M. H. MARTIN.

Board of Editors of the Journal: ALAN STONE. W. N. FENTON was designated Senior Editor. R. E. BLACKWELDER was appointed Associate Editor for a term of three years to represent the Entomological Society of Washington.

Committee on Monographs: E. A. CHAPIN, Chairman, E. P. KILLIP, C. W. REES, NORMAN BEKKEDAHL, and W. R. WEDEL.

The Board of Managers authorized the President to form two other committees: one to consider the JOURNAL and its improvement, the other to make recommendations for the observance of the 50th anniversary of the ACADEMY, which falls on February 18, 1948. Appointed to the first of these committees were: R. J. SEEGER, Chairman, W. N. FENTON, G. A. COOPER, L. V. JUDSON, and H. A. REHDER. Appointed to the second of these committees were: F. M. SETZLER, Chairman, C. B. CLAUSEN, E. W. PRICE, C. E. CHAMBLISS, H. S. BERNTON, GILBERT GROSVENOR, C. L. GARNER, E. C. CRITTENDEN, H. G. DORSEY, W. W. RUBEY, and F. G. BRICKWEDDE.

The Board approved the Treasurer's budget for the year. This represented an increase of $950 over the budget for 1946, and consisted of the following items:

Secretary	$ 400.00
Treasurer	250.00
JOURNAL:	
Printing and Mailing	4,000.00
Office Clerk	300.00
Miscellaneous	50.00
Custodian and Subscription Manager	100.00
Meetings Committee	450.00
Directory	350.00
Total	$5,900.00

The greatest increase was in the printing and mailing of the JOURNAL, and this was due wholly to increased printing costs. The office clerk was given an annual increase of $60, and the Meetings Committee an increase of $50, restoring its allotment to the pre-war figure. Fifteen dollars was added to the amount budgeted last year for the directory yet to be authorized by the Board.

Mr. RAPPLEYE reported his authorization by the Executive Committee for the purchase of $2,000 of U. S. Government Savings Bonds, Series G.

The Secretary was authorized to include with the next meetings notice a card requesting members to consider the JOURNAL as a ready means of publication.

Mr. WALTON, Chairman of the Committee on Meetings, announced that the policy for the coming year was to secure Nobel prize winners as speakers so far as possible.

The Secretary reported the death of the following members: HENRY G. AVERS, of the U. S. Coast and Geodetic Survey, and former Treasurer of the ACADEMY, on January 19, 1947; CHARLES ALBERT BROWNE, formerly of the Bureau of Chemistry and Soils, on February 3, 1947; JAMES HARWOOD JEANS, honorary member, formerly of Dorking, England, on September 16, 1946; and WILLIS L. JEPSON, formerly of the Department of Botany, University of California, on November 7, 1946.

C. LEWIS GAZIN, *Secretary.*

ANTHROPOLOGICAL SOCIETY

The Anthropological Society of Washington at its annual meeting, held January 21, 1947, elected the following officers: President, REGINA FLANNERY; Vice-President, WILLIAM N. FENTON; Secretary, MARSHALL T. NEWMAN; Treasurer, JOHN C. EWERS; Councilors to the Board of Managers, W. M. COBB, W. H. GILBERT, JR., RUTH E. PARDEE, D. B. SHIMKIN, G. R. WILLEY.

A report of the membership and activities of the Society since the last annual meeting follows:

Life members, 1; Active members, 62; Associate members, 26; total, 89. This represents a loss of eight since last year.

The members elected during the year were: Active members—Dr. MARSHALL T. NEWMAN, Mrs. EMIL SADY, Dr. CHARLES E. TUTHILL. Associate members—Dr. E. S. C. HANDY, Dr. JULES HENRY, Dr. OLAV R. T. JANSE, Dr. LAURISTON R. SHARP, Mrs. ROSAMOND B. SPICER, R. M. TATUM.

The Society records its deep sense of loss in the death of Dr. GEORGE S. DUNCAN, Past President and member since 1930.

The report of the Treasurer follows:

Funds invested in Perpetual Building Association (with interest to December 31, 1946)		$1,899.12
21 shares Washington Sanitary Improvement Co. (par value $10 per share)		210.00
2 shares Washington Sanitary Housing Co. (par value $100 per share)		200.00
U. S. Savings Bond, Series G		500.00
Cash in bank		262.62
		$3,071.74
Bills outstanding:		
To American Anthropological Association (subscription to American Anthropologist for one member at $5)	$ 5.00	
		3,066.74
Total as of December 31, 1945		2,913.04
Increase		$ 153.70

A spring dinner was held at the Zoo Restaurant, May 14, 1946; but all regular meetings were held at the U. S. National Museum. The Program Committee for the season, appointed in October 1946, was comprised of Dr. MARSHALL T. NEWMAN, Chairman, Dr. MARGARET LANTIS, and Dr. RUTH PARDEE.

Titles of papers presented before the regular meetings of the Society were as follows:

January 15, 1946, 732d meeting, WILLIAM M. SHANKLIN, *The anthropology of the Arab Bedouin"* (slides).

February 19, 1946, 733d meeting, J. M. COWAN, *Wartime activities of linguists* (recordings).

March 19, 1946, 734th meeting, CORA DUBOIS, *Anthropology in Government.*

April 16, 1946, 735th meeting. T. DALE STEWART, *Anthropology and the melting pot* (slides). Address of the retiring President.

October 15, 1946, 736th meeting, WILLIAM N. FENTON, *Problems of folklore research, illustrated by materials from the Eastern Woodlands* (recordings).

November 19, 1946, 737th meeting, GORDON T. BOWLES, *The impact of the War upon the Japanese people.*

December 17, 1946, 738th meeting, MARY L. DEGIVE and MARGARET CUSSLER, *Hopi horizons* (Documentary film, first showing).

The Society voted to affiliate with the Washington Social Science Federation, and the Secretary represented the Board at a preliminary organization meeting, but the Federation remains in abeyance until other groups of social scientists organize locally.

WILLIAM N. FENTON, *Secretary*

Obituary

GERALD FRANCIS LOUGHLIN was born in Hyde Park, Mass., a suburb of Boston, on December 11, 1880. He died suddenly at his home in Washington, D. C., on October 22, 1946.

His early education was obtained in the public schools of his native community and the Boston Latin School. He graduated from Massachusetts Institute of Technology in 1903 with the degree bachelor of science in mining geology. He was awarded the degree doctor of philosophy by Yale University in 1906. From 1906 to 1912 he taught geology at the Massachusetts Institute of Technology and also gave courses at nearby Tufts College and Boston University.

He was a fellow of the Geological Society of America and of the Mineralogical Society of America and a member of the Society of Economic Geologists, the American Institute of Mining and Metallurgical Engineers, the American Association of Petroleum Geologists, the American Association for the Advancement of Science, the American Geophysical Union, the Washington Academy of Sciences, the Geological Society of Washington, Sigma Xi, and the Cosmos Club.

After a summer as field assistant with the United States Geological Survey he served two years (1904–1906) as a geologist with the Connecticut Natural History Survey. For this bureau he made a survey of the clays and clay industries of the State, and in collaboration with Joseph Barrell he also prepared a report on the lithology of Connecticut.

Between 1906 and 1912 Dr. Loughlin worked during summers for the United States Geological Survey, and in 1912 he joined the permanent staff as associate geologist. From 1917 to 1935 he served successively as geologist in charge of the sections of nonmetallic and of metallic resources in the former Division of Mineral Resources, then as chief of that division, and later as chief of the Section of Metalliferous Deposits. In 1935 he was made chief geologist of the Geologic Branch, a position he held until July 1944, when after 27 years of administrative services he was relieved of such duties and appointed staff scientist. This gave him opportunity to resume geologic research in New England, to which he had long looked forward. He brought to this new work renewed eagerness and enthusiasm, a wealth of broad experience, a practical scientific imagination, and a definite promise of further important accomplishments. His untimely death prevented completion of any part of this work.

Dr. Loughlin's specialities were ore deposits and constructional materials, but his interests and abilities extended much more broadly, into the fields of igneous petrology, structural geology, and metamorphism. His bibliography is large, and his writings show soundness and versatility. He wrote with an uncommon degree of clarity, but he achieved simplicity and conciseness in his writings without any sacrifice of contributory services to the science. As an adviser in the field and office he was generous of his time and interest, always ready with helpful suggestions, a teacher and a counselor in the most felicitous sense. Had his activities not been limited by confining administrative duties, he would doubtless have contributed even more, and always valuably, to the funda-

mentals of geologic science through zealous, sound, and practical research.

In this short space it is not possible to review his geologic work specifically, but it is in order to remark upon the general importance of his contributions. He was an authority in the field of constructional materials and was well known and regarded highly by the industry, so that his advice was solicited frequently. To the geologic profession, however, he was known best for his work on metalliferous deposits, for which he has ranked high among economic geologists. He contributed largely to the science of ore deposits and specifically to the geology of mining districts in Utah, Colorado, and New Mexico. After it was realized in 1910 that large deposits of oxidized zinc ores were present in the Leadville district and had long been overlooked, Loughlin was detailed to study the ores. His report on this subject is outstanding. S. F. Emmons had already begun a comprehensive study of the district, and after his death J. D. Irving continued the work. Irving's death in 1918 left completion of the report to Loughlin who had reviewed the work with Irving, and he was, therefore, as he put it, "the most available to inherit the task" of assembling and preparing for publication the classical professional paper on *Geology and ore deposits of the Leadville mining district, Colorado* (1927). It was a tremendous job of critical assembling and collating of data, but he possessed rare ability in such lines, and the resulting report was monumental. Later he made extensive studies in the Cripple Creek district and recognized the unusual and complicated nature of the structural control on the localization of ores in the "crater" or basin. He published several papers relating to the modes of occurrence and finding of ore both at Cripple Creek and at Leadville.

His chief hobby was music, and he composed and arranged scores. For a long time he was director of an orchestra composed of young people of All Soul's Unitarian Church, and at various times he directed choral groups, some of which were composed wholly of Geological Survey personnel. Until administrative duties demanded too much of his time and energy he was a principal organizer and contributor to the Pick and Hammer shows.

He was fond of sports, and of young people, with whom he delighted to work and play. He was ever gentle and understanding with youngsters, whether his own grandchildren in whom he took great pleasure, or the neighborhood gang whose scrub baseball games in the vacant lot or in the street sometimes brought him to the scene, not as spectator, but as an active participant. Broken glasses and bruises sometimes brought a resolve to be more circumspect, but happily the resolution would soon be forgotten. He loved to talk of batting averages and the life histories of major league baseball players of the past and present with his young friends.

He was a fond and devoted family man. He had a warm liking, too, for his fellow men and never took intentional advantage of anyone. He always wanted to be friendly, but he was naturally reserved and undemonstrative and as a consequence was often misunderstood. Beneath a rather solemn mien, which was begot of natural shyness, there was a ready, deep sense of humor that sometimes sparkled with dry, good-natured satire but was never mean or bitter. In a way he was a contradiction; his shyness and reserve were abandoned when he disported in a Pick and Hammer show, and he delighted the audiences with his antics and excellent mimicry.

Gerald Loughlin never shirked a duty, and he never sought prominence. He was systematic and conscientious in the performance of his offices, and his greatest satisfaction was obtained by accomplishing his tasks as he thought they should be done. He was incapable of subterfuge or pretentiousness. Personal gains were never considered in making his decisions. But he looked into his heart as well as his head, and he did what he thought was justly demanded by the particular circumstances. His New England conscience forbade either disloyalty to or exploitation of others. He was a good citizen. It was a part of his fiber that he should always do what the honesty of his soul demanded, so that he seemed indeed to live by the precept—

> To thine own self be true,
> And it must follow as the night the day
> Thou canst not then be false to any man.

L. W. CURRIER
J. S. WILLIAMS